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ETHNOLOGY.

CONTRIBUTION TO THE HISTORY OF THE ALEUTIAN ISLES, OR ALEUTIA.

BY ARTHUR B. STOUT, M. D., SAN FRANCISCO, CALIFORNIA.

In the course of the year 1874, the California Academy of Sciences received the donation from the Alaska Commercial Company, of San Francisco, of two skeletons or mummies. These specimens were two from a collection of a dozen or more which were by them presented to the Smithsonian Institution at Washington. A report upon these latter was published by the Smithsonian Institution, and written by W. H. Dall, U. S. G. S., in 1878. To this very valuable essay on "The Remains of Later Prehistoric Man," I refer, with great pleasure, for many important details omitted in this paper.

The two mummies in question have remained in my care, as Curator of the Department of Comparative Anatomy of the Academy, since 1874, and, except to open the cases which contained the bodies, to disinfect and carbolize them, I have not until now ventured to study them. But such is the increasing interest in anthropology; in the prehistoric condition of man; his evolution; his ethnologic and archæologic history, that I have thought it important to disturb these remains and offer the work for comparison with that of other similar researches.

The source whence these mummies was procured is best described by quoting as follows from the report of Mr. Dall:

"The most celebrated of these burial caves was situated on the island of Kaga'mil, one of the group known as the Islands of Four Mountains, or Four Craters. This group is not at present inhabited, except for a short period during the hunting season of each year.

"I visited these islands in 1873, but as the shores are precipitous, and as there are no harbors, the weather was too boisterous to permit us to remain in the vicinity. Even if we had landed, it is probable that we could have done little without a guide.

"The traders in the islands were aware of the existence of this cave and its contents, and one of them, Capt. E. Hennig, of the Alaska Commercial Company's service, had several times attempted to reach it unsuccessfully. In 1874, however, the weather being quite calm, and the presence of a hunting party, which he was taking away from the island, enabling him to find the cave without delay, he visited it and removed all the contents, so far as is known. On their arrival at San Francisco, the Company, who had instructed their agents to procure such material for scientific purposes when compatible with the execution of their regular employment, with commendable liberality, forwarded them to the National Museum at Washington. Two of the mummies were given to the California Academy of Sciences, but all the rest were received by the Smithsonian Institution. It is unfortunate that but few details were obtained as to the exact disposition of the bodies, or mummies, in the cave; the situation and form of the latter, and other particulars which would have had great interest. From accounts received from Father Innokenti Shayesnikoff, previously, I am led to infer that the cave is situated near the shore at a point where the coast is precipitous and without a beach, the landing being on large, irregularly broken fragments of rock, the tables from the cliffs above. The island contains active volcanoes, as I am informed, and in the immediate vicinity of the cave are solfataras, from which steam constantly arises, and the soil is said to be warm to the touch. The rock is of a whitish and ferruginous color and sharp grain. Specimens examined by Dr. Endlich, of the Smithsonian Institution, prove to be a silicious sinter, containing a little alumina and soda, and some hydrous sesquioxide of iron. In the spectroscope traces of lithium and potassium and possibly a trace of lime were seen.

"From this, and from the fact that the atmosphere of the cave is said to have been quite hot, rendering it uncomfortable to remain in, it is possible that the cave itself may be the crater of a small extinct solfatara.

"With regard to the age of these mummies, as they may be styled, I was informed, in 1871, by several of the more intelligent natives, that they fixed the date of the earliest interment in the following manner: It occurred in the autumn or winter. During the following spring the first Russians ever seen by the natives of the Four Craters, arrived in the vicinity. These may have been Trapeanikoff's party, which left Kamschatka in 1758, but did not reach Umnak until 1760; or they may have been that of the infamous Pushkareff; or possibly of Maxim Lazeroff; but in any case, they can hardly have been the expedition

of Bering. In 1757 Ivan Nikiferoff sailed as far east as Unak, being the first Russian to do so, except those of Bering's Expedition, who did not land on any of the Andreanoff group, though in 1741 they saw the shores of numerous indeterminate islands from a distance. The earliest date, therefore, which we can assign to these remains would be 1756, making the oldest of them about one hundred and twenty years old.

"At all events they possess great interest as the best preserved relics of the state of things as they existed immediately prior to the Russian occupation, and when their pursuits and handiwork had not been modified by the introduction of any of the adjuncts of civilization."

The two specimens were preserved, each in an excellent case with glass cover. No implements whatever were found. No. 1 contained the skeleton of a man, and No. 2 contained the skeleton of a woman. This latter had been disturbed and the strappings of the package were off. The former was yet intact and its original binding unbroken. The odor was strong and penetrating, not that of putrefaction, but like creosote; not unlike that of buffalo robes smoke-dried by the North American Indians in their wigwams, only much more pungent. Large quantities of the larvæ of insects were in the cases, showing that animal life had been busy in the bodies.

The hope was now entertained that we possessed, perhaps, the remains of the distinguished toyon, or toygon, Kat-haya-Koochak, the renowned Aleut chief, famous for his courage, enterprise, riches, and love of family. (See Dall's Report, page 9.) But this chief is described as "a very small man," while our chief measures 5 feet 9 inches in the bones. Two units being allowed for skin, flesh, and general shrinkage between vertebræ, would give 71 inches, or 5 feet 11 inches. His cerements are of the simplest kind, while one of the mummies described by Dall was clothed in the finest wrought and most costly fabrics. Hence ours cannot be the remains of this great Aleut.

The strappings of the packages being taken off, a large sealskin envelope carefully wrapping the bodies, and much deteriorated by time was unfolded. Within this, and covering closely the anterior part of the body was the spoiled and disintegrated skin of some large bird, some of the feathers of which were still clinging to the rotted fibres of the skin. The bodies now exposed were yet in some places covered with the skin; in other parts the bones were entirely denuded. The skin was dark colored, desiccated and of pachydermic toughness, requiring the saw, rather than the knife, to divide it. It was also perforated with numerous little round holes made by some boring insect. No traces of viscera remained, but the thoraces were not opened. Whether evisceration had been practiced at the time of embalming, or whether the intrusive animal life had consumed them, was not easy to determine, but the crania were entirely empty, and we can hardly believe that the embalmer removed the brain. The limbs were carefully and most compactly folded on the body, apparently to make the embalmed package as tight and small as possible, and might be laid flat or placed in a sitting posture. The heads were depressed so that the chin settled down

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into the pit of the neck, and the lower maxillæ being thus forced down, the mouths were wide open.

It is regretable that photographs of these mummies cannot be offered, as in the picture given by Mr. Dall the limbs are dislocated and distorted, failing entirely to express any idea the embalmers may have desired to perpetuate, or the admirable care and solicitude in their work. The thighs were brought up and doubled close upon the abdomen; the legs folded snugly upon the thighs, and the feet pressed sharp down backward. The arms were laid symmetrically on the thorax, and the forearms bent upon the arms, the hands not crossed in repose upon the chest, but with the fingers curved over the front of the shoulders.* Thus much for the aspect of the bodies.

What may be the origin, we may ask of these people? Whence came they?

It is not probable that an autochthonic race existed in these Aleutian Islands. Such rude, inhospitable storm beaten regions were not likely to be the cradle of a special tribal birth. Regarding these islands as they appear on the map, the idea is forced upon the mind that at some remote epoch the two continents of Asia and America formed one territory. The volcanic nature of the entire region indicates a vast change of the earth's surface by which the constinuity of the continents was destroyed. The long promontory of Aliaska extending from Alaska, nearly touches the easternmost island of the Aleutian chain. A long succession of wild eruption-torn islands in a crescentic line crosses the sea, thence to the Kamschatkan coast; the whole group, hung like a grand festoon of gems formed by Titan hands and resplendent with the illumination of volcanic fires, appears suspended from shore to shore, to adorn the approaches to the Straits of Behring, or rather, in a military view, like a vast circumvallation of fortresses to defend their entrance from invasion. But the Arctic Ocean has its own defences and needs no such gigantic ornament. Only the ruined abutments now remain of the "bridge," which some author calls the Aleutian Islands, by which migrations of peoples passed from continent to continent, and the bridge was the segment of a circle.

This view seems sufficient without seeking a Malay, Japanese or Chinese origin for the natives of the Aleutian Isles. Their progenitors were an autochthonic race. It is a prevailing opinion that a vast invasion of wild tribes from the far northwest poured down upon the ancient mound builders of North America, sweeping them away from their copper mines on Lake Superior, destroying their temples, burial places and fortresses in the valleys of the Ohio and Mississippi, and exterminating their race or driving them back whence they originated, across Texas into Mexico and Central America, leaving no vestiges of them but their teocallis and their mounds. How immense must have been such an invasion and

* In regard to Aleutian burial ceremonies, says Coxe, page 173: "The bodies of poor people are wrapped in their own clothes, or in mats, then laid in a grave and covered with earth. The bodies of the rich are put, together with their clothes and arms in a small boat made of the wood driven ashore by the sea; the boat is hung upon poles placed cross-ways, and the body is then left to rot in the open air."

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how persistently continuous in its course, to have so completely obliterated the numerous and extended populations of the Mound Builders, possessed as they were of the defences and weapons of a high civilization. The great nomadic incursions recorded in history, like that of Genghis Khan into Europe, become inconsequential in the comparison.

If such things did occur it must have been at an epoch long anterior to the present condition of the "far northwest." Earthquake and cataclysm, the battles of fires and waters must have created greater disturbance with far more destructive and radical invasions than any human agency could have accomplished. The present state of the physical geography of this "far northwest" utterly precludes the possibility of any such invasions, fulfilled by barbaric hordes. Neither time nor circumstance could accomplish under such physical conditions so gigantic a work and have left not even a mound or a mile-stone to mark its route.

There must have been upheavals of volcanic peaks with their boiling lava chimneys forming mountains merged in the waters with only their summits visible above the ocean, like the island of the "Four Craters," and again a subsidence of territory from the caving in of the vast subterranean cavities emptied of their seething contents. With all this must have occurred an inundation of waters, in which great cataclysm the waters of the Atlantic and Pacific Oceans blended, the grand Gulf stream of the former passing through the Arctic Sea by the Straits of Behring with the equally grand Pacific Black Stream, or Kuro Shiwo. Before this epoch the ancestors of the Esquimaux in America and the Koriaks, the Chukches, or Tungusian Tartars of Asia may have traded, and dwelt in their igloos together.*

Let all this be as it may, at the time that the Russians discovered these islands, the natives of the different groups spoke different languages, and, hence we may infer that the inhabitants of the various groups were the remains of migrations from both America on their east and Asia at their west, as they again coalesced, and were regenerated from the lapse of time.

Some question has been made of the derivation of the name Aleut, and even suggested that it was a term of contempt of the Russian explorers and fur hunters for the islanders, (see Dall's Report page —,) but we find in the work of Wm. Coxe, A. M., London, 1780, Russian Discoveries Between Asia and America, published just 100 years ago, that the word Aleut is Russian, meaning "*a bold rock.*" Such is the distinctive character of all the islands, and, hence seems peculiarly adapted as their title.

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* The pent-up waters of the Arctic Ocean burst through the Behring Strait and overwhelmed the ruins left from volcanic fires—as the waters of the Nevadas by a thousand floods at some epoch tore through the Golden Gate. As a further illustration of this subsidence and upheaval it is recognized that the waters of the Arctic Ocean once penetrated the American continent as far—if not still further—as Great Slave, and Athabasca Lakes, and that that long chain of lakes in the interior of the continent are only the vestiges of the departure of the greater sea. In the same manner as it is conceded that Siberia was once covered by the Arctic waters, the remains of which are the Lake Baikal and the Caspian Sea, while such great rivers as the Lena, Yenessei and Anadyr now drain the mountain lines back to the retreated ocean.

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A glance at the grouping of these islands is important to our purpose. 1st. At the northwest of the semi-circular girdle are Behrings Island and Copper Island, where large outcroppings of copper indicate an abundant mine of the metal, and possibly point to a line of copper vein from the shores of Lake Superior over the region of the Coppermine Country in Alaska to this deposit. We may remark in passing, that it is surprising that with this free surface deposit of copper at this locality, no copper implements have been discovered among the relics of the old Aleuts.

2nd. Say SE. are the Aleutian Islands proper, viz: Attak, Semitski, and Shemiya, W. NW. to E. SE.

3d. Then, NE. some six islands, the Andreanoffski group, or *Ostrova*, meaning islands, and

4th. The Lyssie Ostrova, or Fox Island, stretching SE. and N. by E. almost to the Alaska promontory, and the last discovered at the epoch now alluded to.

This last important group contains Umnak, Ounal-askka, or Aghunalaskka, the principal depot of the Alaska Commercial Company, with St. Paul and St. George further to the north, and also the barren deserted isle, one of the "Four Craters" or Kagámil. In a cave of this island, a bold, bluff, mid-ocean, storm-lashed in its arctic clime, but yet still seething and steaming with solfataras, and volcanic heat, is the Mausoleum of our Aleut Chief and all his family. Here we meet him and his progeny on a desolate fragment of the ruptured territory which once united the two great continents—the monumental stone of the ruin not only of the land but the division of unnumbered peoples. Imagination may picture, but cannot surpass the grandeur of the truth. Another division of the Aleutians is:

I. The Kaniagmuts, and II. The Aleuts. III. The "Vaygeli," or Spectral Outlaws. These are supposed to be the original inhabitants who disdained any outside authority, refused to be converted to Christianity, and consequently live, if such really exist, as independent natives or banditti in the interior inaccessable mountains.

The Vaygeli may possibly be only the predatory animals which come at night and carry off the islanders' provisions. But the mythical or legendary belief of the natives points distinctly to ancestral sagas which have been orally handed down to them from generation to generation. We may infer either an extinct prehistoric race with which the present family has no lineal descents, or we may refer the legend to the earliest progenitors of present tribal groups.

As regards our present mummies they are undoubtedly too recent, whether we allow them 120 years, or about 340, according to Captain C. L. Luneuski, to consider them in the light of *prehistoric* remains, or concede to them Mr. Dall's distinction of "Remains of Later Prehistoric Man" Capt. Lunieuski has been a resident of the Aleut Isles for many years, connected with the Alaska Commercial Company. He antedates our mummies many years to the Russian discovery and conquest of the islands. His intelligent studies predicated in part

on the diversity of their languages, gave to the Aleuts a divided descent, in part from the Esquimaux of America, and the Mongoloids of northeastern Asia.

The Russian explorers and fur-hunters of importance in the discovery of the various islands were:

Bering in 1728
Bering and Tcherihoff in 1741
Nevodsikoff in 1745
Serebranikoff . . . . . 1753 to 1756
Trapesnikoff . . . . . 1758 to 1760
Bethshevin . . . . reached Alexsu, furthest island east.
Tolslyh . . . . . 1760 to 1764

These navigators, with few exceptions, treated the natives with great barbarity. Many of their expeditions were failures and their vessels wrecked; several of them were burned by the natives. All of them suffered great hardships. Of their vessels, says Coxe, page —, "Most of them which are equipped for these expeditions, are two masted; they are commonly built without iron, and in general so badly constructed that it is wonderful how they can weather so stormy a sea. They are called in Russian *Skitiki*, sewed vessels, because the planks are sewed together with thongs of leather. Some few are built in the river Kamschatka, but they are for the most part constructed in the haven of Ochotsk. The largest are manned with seventy men, the smaller with forty men."

Hence the Aleuts, as naval constructors, with their elegantly and artistically built bidarkas and baydars far excelled in skill their abusive invaders. But these latter had guns. In their warfare they displayed much military invention. To avoid the guns they constructed large double screens made of seal skins, stuffed between with dried fibre of grass, and advanced toward the vessel, pouring upon its deck their missiles from behind, and finally setting fire to it with sulphur found in their island craters.

Inside of the war faculty, and touching the home and domestic idea, wild to our appreciation as it may be, we are taught by the elaborate and exhaustive report of Mr. Dall on the mummies from our "Four Crater" cave, that their art work by their women, whether the result of nearly lost hereditary culture, or of native original industry, patience and invention, was high in its excellence. (See report of Case 17478 in the Museum of the Smithsonian Institution, page 11 of Dall's Report, cited). This ethnological description is rich in its suggestive text. How did the Aleuts learn to make these extra fine fabrics, with nothing but Aleutian raw material? Our present chief is silent but he left head enough to explain it all.

In brief, from all this we can derive enough to feel sure that this ancient folk, after their own way of thinking, education, and old civilization, possessed a high sense of religion, believed in a future life, as proved by their devoted funeral ceremonies, worshipped a divine creator; appreciated the love of home, were profoundly impressed with the devotion due to the family bond. Still further may we trace the illustration, for if cranial capacity and form can be regarded as

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the index of mental ability, we have shown that the eagle-like tenant of his northern fastness was worthy of his eyrie. Again, will it appear that here on the confines of nations, in the same tomb, the two great types of the human races, the dolicocephalic and the brachycephalic heads, were together embalmed.

When the Russians discovered the islands the Kamschatdale interpreters, who could speak the language of the Aleut group could not understand the dialect of the natives of the Fox Islands. To obtain their objects they resorted to the cunning device of utilizing the paternal affection of the chiefs. Under pretense of keeping the peace and insuring the tribute of seal skins, exacted by the Russian Government, they caused the sons of toygons, or chiefs, to be delivered to them as hostages. These they sent to Kamschatka to acquire the Russian language. The celerity and aptitude with which these boys learned to interpret went far to prove the natural intelligence of the people so more than barbarously treated by them as barbarians. As reward for their services they converted them as usual to Christianity, but piously took their skins; nor did they fail to appropriate their women, which, as "*ante Trojam fuit*," was always the cause of their wars with the Russians. Their hospitality, kindness, and indispensable aid to the invaders of their realm were devoted and unceasing, until deceived, as were other Indians by Cortes and Pizarro, by lust, and the "*auri sacra fames.*"*

The existence of three languages, or perhaps dialects, may be inferred, for Coxe states, (page 264,) that the inhabitants of Unalaska were called Khigolaghi; those next eastward to Unimak were named Kighigusi, and those of Unimak and Alaxa, were styled Kalaghayekïki. In 1741 Bering sighted and Steller first landed on the American continent. (Coxe, page 277).

The Russians conquered Kamschatka in 1696, taking 45 years to discover the way from shore to shore. As the islands then were peopled, so in probability were their languages introduced, by the various tribes of refugees in quest of safety in flight, or as hunters of game from the shores of both continents, or as they mingled before the continents were cleft apart.

Consul General Heap, of Constantinople, in a recent dispatch, informs the State Department at Washington, that the Turkish authorities have determined to grant the concession desired by Prof. Charles Eliot Norton, of Harvard University, of the right to investigate the remains of an ancient Greek city upon Turkish soil. It will take some weeks for the concession to go through all the red-tape process of the Turkish Government, but there is no reason to doubt that the expedition will be on its way next month, and that the work will begin at the ancient city early in February. This expedition is unprecedented.

* Their phallic customs are more worthy of leniency than are the morbid abuses of other people.

ANTHROPOLOGY.

ARCHÆOLOGICAL RESEARCHES IN NICARAGUA.

Number 383 of the Smithsonian Contributions is an important addition to our knowledge of Ancient America, entitled "Archæological Researches in Nicaragua," by J. F. Bransford, M. D., Passed Assistant Surgeon, U. S. Navy. Washington City: Published by the Smithsonian Institution, 1881." Dr. Bransford made three journeys to Nicaragua; one in 1872, with Commander E. P. Lull, a second in 1876, when several months were spent in archæological explorations, and a third in 1877, at which time the author's investigations were extended to Nicoya, in Costa Rica. Excepting the last named excursions, all the excavations were made on the Island of Ometepec, and to a slight extent near San Jorge on the mainland.

The geology and natural scenery of the island, the lake, and the surrounding country, are so graphically described that the reader will have no trouble in following the narative and in catching the relation between the sites explored and their environment. The hacienda of Don José Angel Luna having been placed at the author's disposal in 1876, most of the work was done in that vicinity. To reach the burial vessels it was necessary to dig down through a layer of light ash and volcanic cinder, a second of old lava much decomposed, a third of gritty ash, to the fourth, of black sand similar to that now forming the neighboring beach. Pottery, beads, shells, human bones, etc., the necessary concomitants of such a site, were found in abundance. The great interest of the exploration, however, and the *raison d'être* of the book are the burial jars; some globose, others with wide flaring mouths, but the greater number belonging to the unique shoe-shaped burial urns of coarse red material, over the mouth of which were placed delicate bowls of thin yellow ware elaborately painted.

To the description of the covers which are called Luna ware, especially to the elucidation of the designs upon the exterior and the interior surface, Dr. Bransford gives the greatest attention. It is very much to be regretted that his artist is so far behind him; indeed, in a few instances, has omitted from the drawing the very features alluded to in the text. It is a grave fault of nearly all who attempt to illustrate savage technique that things are represented more regular and beautiful than they really are. In this instance, however, the picture falls very far beneath the reality. The two plates of photolithographs at the end are worse still, the objects seeming to be blurred and out of focus.

On page 15—19 will be found a detailed list of the burial urns, giving their shape, the width and depth of both jar and cap, and the position and the contents of each. The author, after reviewing what has been said concerning the origin of the shape of these unique objects, inclines strongly to the view that they

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are rude representations of birds. Stone graves similar to those of Tennessee, and mounds also, occur in the locality examined. Stone images already made familiar to us by Stephens and Squier, and rock carvings form the closing pages of the chapters devoted to Ometepec. Chapter III relates to Palmar, on the mainlaind, in the department of Rivas, northwest of San Jorge; Managua; San Juan del Sur; and a pottery manufactory near San Jorge. Chapter IV gives a description of Nicoya and an enumeration of objects in greenstone. The concluding chapter is devoted to the historical relations of the tribes formerly inhabiting the region, beginning with the Aztec tribes of the conquest and working back to the people of the shoe-shaped burial jars, "more closely connected with the South Americans than with Nahuas and Mayas of Mexico and Guatemala." —*American Naturalist.*

NORSE MYTHOLOGY.

The traveler in Switzerland passing from one village to another finds himself ever and anon at the foot of a glacier, where he beholds in the weird cathedral outlines the crystallized remains of the soft and plastic snow,—in its high mountain origin so homogeneous and so circumscribed, in its terminations so widely separated and so strongly individualized. The same is true of the world's mythologies, all having their origin in the sensitive spirit of man as it ponders over and reaches after the unseen cause of all phenomena, but transformed into distinct systems through the laws of nature and the influence of circumstance. The comparison of these various resultant forms constitutes one of the most valuable chapters in anthropology. It is impossible to attempt a scientific classification, much less to make reliable deductions until all the descriptions are in. We are indebted to S. C. Griggs & Co., of Chicago, for the third edition of a volume upon Norse Mythology, by Prof. R. B. Anderson. The introductory portion of the work, though written in a style of glowing enthusiasm, does not please us so much as parts I, II and III, relating to the creation and preservation of the world, the life and exploits of the gods, and Ragnarak, or destruction and regeneration. The three sections are dedicated to Urd (was), Verdando (is), Skuld (shall be).

The chief depositories of the Norse mythology are the Elder or Saemund Edda (poetry) and the Younger or Snorre's Edda (prose). The former consists of thirty-nine poems collected by Saemund the Wise (1056—1133), eleven of which, embodying the system of mythology, are minutely analyzed in the volume. The Younger Edda was written by Snorre Sturleson, the author of the *Heimskringla* (1178—1241). In addition to these it is necessary to study all the Icelandic Sagas, the Anglo-Saxon Boewulf's *Drapa*, and the Niebelungen Lied.

The gods and goddesses (*æsir* and *ásynja*) dwelling in Asgard are Odin (chief of the gods), Thor (god of thunder and keeper of the hammer), Balder (summer-sunlight), Tyr (Zeus, the one-armed god of war), Brage (god of poetry), Heimdal

(the heavenly watchman), Hoder (the Norse Cain), Vidar (slayer of the Fenris wolf), Vale (brother of Balder), Uller, Forsete (the peacemaker), and Loke (the evil giant-god). The goddesses are twenty-six in number. Odin's hall is the great Valhal. The tree Ygdrasil, striking its roots through all worlds, spreading its life-giving arms through the heavens, and furnishing bodies for mankind from its branches is beautifully described (188, and 205). The second part of the volume, 215—409, constitutes a perfect classical dictionary of Norse mythology, adding to its richness of detail the enthusiasm of intense sympathy.

The final destruction of the world, and regeneration of gods and men, is called Ragnarak. This theoktonic myth is wanting in Greek mythology. Ragnarak is an outbreak of all the chaotic powers, a conflict between them and the established order of creation.

The student of comparative mythology, upon taking a work of this class in his hand, almost instinctively asks what the author will do with his body of myths. It is possibly to run any theory to extremes and to say some very silly things, as Tylor and Baring Gould have shown us. Here is the point where the sympathetic reader trembles for his author. Professor Anderson, while taking the nature of Norse mythology, handles the subject with extreme caution. The myth reflects nature and society, the one inextricably in communion with the other. The harsh climate of the North modified not only the Norse Mythology, but also molded indefinitely the national character, and then the two acted and reacted upon each other.—*American Naturalist.*

CRUISE OF THE CORWIN IN BEHRING SEA AND THE ARCTIC OCEAN.

Document No. 118 of the Treasury Department, Nov. 1, 1880, is a report of the cruise of the U. S. Revenue Steamer *Corwin*, commanded by Captain C. L. Hooper, U. S. R. M., in the Behring Sea and the Arctic Ocean. In addition to the customary duties of the Revenue Service and the search for missing whalers, Capt. Hooper gave a great deal of attention to ethnological research. The sad story is told of the starvation of several whole villages on St. Lawrence Island, indeed over four hundred natives had died in this manner upon this one island in two years. The author attributes the great mortality to the improvidence caused by whisky. It seems rather heartless, but really, four hundred skeletons, or even crania, of this homogeneous group of people, would be a precious acquisition to any museum.

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CORRESPONDENCE.

SCIENCE LETTER FROM PARIS.

PARIS, May 24th, 1881.

Much attention is being devoted to the causes which determine the aptitude or immunity with animals for maladies. This is in a general sense called medical geography, as a physician who has prescribed for patients in various parts of the world, and belonging to different races—the white, yellow, and black, has been able to note the diversities in the same disease and the contradictions in the remedies employed. The true social peril, hardly discovered before we became aware how to conjure it, lies in those legions of animalcules or microbes, that surround us, and in the middle of which we live. M. Pasteur has revealed them to us as the factors in infectious diseases. Claude Bernard has demonstrated the community which exists between animals and vegetables—phenomena of movement, of sensibility, of production of heat, of respiration, of digestion even, for there are the Drosera and kindred carnivorous plants. Iron cures Chlorosis in vegetables as well as in animals, and chloroform and ether render both insensible. There resemblances are more striking still between animals. After Baudrimont, insects are, in presence of alcohols, chloroform and irrespirable gases, similarly affected as man. Many maladies, too, are common to man and several species of animals; and this organic identity is best illustrated in the relationship between epidemics, and epizootias, cancer, asthma, phthisis, small pox, rabies, glanders, charbon, etc., afflict alike man and many species of animals. The differences between races are not less remarkable, odor and taste for example. According to anthropohagy, negroes are best, and white people most detestable. Broca remarked, that in the dissecting-room the muscles of the negro putrified less rapidly than those of whites. It is perhaps to these anatomical differences that the diverse action of the same poison, in the case of races or species, may be attributed. On certain rodentia belladonna exercises no influence; morphine for a horse is a violent stimulant; a snail remains insensible to digitalis; goats eat tobacco with impunity, and in the Tarentin the inhabitants rear only black sheep, because a plant abounds which is noxious for white sheep. The nature of these conditions is a mystery for science. The Solanæ tribe of plants furnish a principle which, as its name implies, produces consolation or forgetfulness, by acting on the tissues of the brain where resides the organ of thought; now on the authority of Professor Bouchardat these opiates have the less of effect in proportion as the animals possess the less of intelligence. To the same anatomical peculiarities must be ascribed the choice that disease makes in such or such a race. Glanders for instance, so virulent with the horse, the ass, and man, produce in the case of the dog only a local accident; peripneumonia, so contagious among horned cattle, is more benign in its action on

Dutch than other breeds of stock; the cattle plague that decimates so many farms, is communicated by cattle to each other from the slightest contact, while the closest and most constant association is necessary to communicate the disease to sheep, and even when they are affected, its action is not severe. Further, that plague only attacks ruminant animals—oxen, goats, sheep, zebras, gazelles, etc. Ten years ago this plague broke out in the Jardin d'Acclimatation; not a ruminant escaped, and also one animal not of that class, a little tenant nearly related to the pig—the *peccari.*

Now, Dr. Condereau has demonstrated recently, that the stomach of the pig has a rudimentary organization recalling that of the ruminants. Clearly the stomach of the peccari, and perhaps that of the pig, present a favorable medium for the parasitical microbe peculiar to the rhinderpest. In the potato disease again, all the varieties are not affected with the same degree of violence, it is more marked in its action on the round yellows than the reds, and on the latter, rather than the pink. But the symptoms even of the same malady differ, the parasite's attacks on the tissues being dissimilar. Oak galls are produced from the prickings of insects; now around the same larva, often four varieties of galls are recognized. In the case of consumption in cattle, the disease marches slowly; in that of pigs it takes the galloping form, as with man.

Each people or nation has its peculiar pathology and also its peculiar cures. A negro can take a dose of tartar ten times more excessive than a white; the same dose of brandy given to a black, a yellow and a white, will not produce on the three men, either drunkenness at the same moment, or intoxication at all. Mulattoes can sustain more drastic aperients than other races; the negro does not suffer from yellow fever, but he readily falls to phthisis; he will catch the cholera more quickly than a white. Human races where they may catch the same intermittent fever at the identical moment and in the same swamp, will not the less display different types of fever. Dr. Crevaux has shown that a certain insect with the North American Indian is not the same as with the negro or the maroon, and both differ from that peculiar to Europeans.

M. Pasteur's beautiful experiments have conclusively demonstrated that fowls do not catch the *charbon*; now the vital warmth of birds is from seven to nine degrees higher than in the case of mammiferous animals; he imagined that if the fowl was cooled down by baths to the lower temperatnre, it would be liable equally to become affected; he tried, and the result proved he was correct. The absence then, of a certain temperature would be the reason why birds are exempt. The microbes are the agents of infectious disease: when these swarm in the blood of an individual, they seem to leave there something pernicious for parasites resembling themselves, or to bring away with them something necessary to the life of their successors. A glass of sugar and water where leaven has already fermented and yielded alcohol, is incapable of producing a second crop of leaven; similarly the blood of an individual once contaminated, becomes uninhabitable afterward for like microbes. The individual has acquired immunity. Such is the principle of vaccination.

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M. Alp. Milne-Eduards states that they are chiefly birds, which give the special character to the animal population of the antarctic zone. One would have imagined that birds, endowed with the means of flight or swimming would be able to migrate to other and more genial regions.

M. Faye has examined the popular idea of the constitution of the moon; the large grey spaces, so visible during the first quarter of our satellite, are not seas, as the ancient astronomers concluded; there is not a single drop of water in the moon even in its most profound pits: the most fanciful names were given to these assumed seas; Felicity, Dreams, Calms, and Crisis, and hence were presumed to influence on our earth, marriages, mental life and maladies. In the moon there is no trace of rubbings of rocks, etc., having never had water, the moon had no agents of disintegration to act on its surface, as rain, rivers, torrents, and snow do upon our globe; all is vacuum on the surface of the moon and nothing preserves so well as vacuum. On looking at Mars through a telescope, that planet presents a different aspect as compared with the moon; it possesses an atmosphere; it has seas and continents, fogs and snow; its north pole is white like the earth's, and the temperature increases as the tropics are approached. It is possible that Mars is inhabited; it has oxygen and watery vapor, but other things are necessary for the sustenance of animal and vegetable life. Plants cannot live without carbonic acid, and if this be absent in the atmosphere of Mars, vegetation being impossible, animal life cannot exist. Is that planet inhabited, but with beings different from us? No, is the response of science, for the more we know of science, the more we see the fundamental laws of nature become general and extend to the whole universe. Everywhere we find the same chemical elements, in the heavens as on the earth; the same affinities, the same combinations, as well in the stones which fall from the sky, in the most distant stars, as in our laboratories. Why then ought it not to be the same with the essential laws of life? Universal physiology cannot then differ from ours. Plants cannot live on a planet where the temperature never rises above freezing point, and never descends below that of boiling water. In the first place germination could not take place, the seed would be frozen; in the second, the seed would be cooked.

There are no volcanoes in the moon, because that would suppose the existence of water, and eruptions are caused by sea water penetrating by fissures into the bowels of the earth, there acting, as Daubrèe has shown, on the molten silicates of the internal mass; incorporating with and transforming without extinguishing them, into a boiling and explosive mass. All volcanoes are situated on the borders of sea or oceans, and emit vast quanties of watery vapor. Further, lime is an essential of life. When our planet commenced cooling down, its first envelope was granite, for the simple reason, that the elements of granite, being the lighest of all primitive matters, ought to have kept near the surface. Granite contains no chalk, that indispensable ingredient of organic life, hence, why no fossils are found in the granite, but under the unequal pressure of the solidified crust, and

the unequal cooling of sub-marine regions, fissures were produced here and there in the granite, and the heavy silicates with bases of chalk and iron, were projected upwards to the surface, where the water with carbonic acid in solution, decomposed the silicates, and the lime set free was carried off by the seas. Life succeeded this putting into circulation of lime. But these is nothing analogous to all this in the moon; her presumed volcanoes are mere circuses with depths three miles in profundity, while the deepest of mines is not more than one-third of a mile. The moon is exempt from physical commotions—all there is tranquil; nothing will be changed there again; it is a desert-death forever.

M. Hausez has conducted some very curious experiments respecting the faculty of odor in insects. He placed before several insects glass rods dipped in turpentine and vinegar, the moment he brought these near the antennæ of the insect, the latter agitated their antennæ and immediately returned on their route. Clearly they experienced the odor; but the moment the feelers were cut, the same insect when placed in contact with the rods, gave no more signs of aversion. Ordinary flies that had been attracted by a morsel of corrupted meat, had one of their antennæ cut off and then set free, they flew about as usual, but were no longer able to detect where the rotten meat was.

Tooth grafting appears to be on the increase. Dr. Magital has introduced several improvements likely to make the process still more general, and which was rather in vogue during the eleventh century.

Dr. Boudet is on the point of making a valuable discovery; that of treating pains by means of mechanical vibrations; he has cured several cases of persistent bad headaches and neuralgia. The use of metals as remedial agents has given, since two years, very extraordinary and happy results.

F. C.

BOTANY.

THE TREELESS PRAIRIES OF THE WEST.

PROF. THOMAS MEEHAN.

At a late meeting of the Academy of Natural Sciences, of Philadelphia, Mr. Thomas Meehan remarked that the absence of timber or arborescent growth on the grassy prairies of America, still continued to be a matter of controversy, but he believed that in the light of accumulating evidence, we might now come to a positive decision in regard to the question. The most prevalent belief had been

that trees would not grow on these prairies,—and we have had theories relating to soil or climate, to show why they could not grow. Then there were others who believed that trees did grow there in ancient times, but had been burnt off, and kept burnt off by annual fires.

Mr. Meehan considered in detail, the authors who had propounded various theories, and the distinguished men who had advocated them, and said that it was evident climate could have nothing to do with the question, because in these prairie regions there were often large belts of timber lands, projected like huge arms into the grassy regions, with precisely the same climatal conditions over both. That the soil was not unfavorable, was proved now by the artificial plantations everywhere successful, and that the soil was unfavorable to the germination of tree seed, as suggested by Prof. Whitney, was on the face of it untenable, from the fact that it required but the same conditions for the seeds of trees as for those of herbaceous plants, the number of species of which on the prairies was well known to be very large. Another great gain to out present knowledge, was that since the annual firing of the grassy prairies had been discontinued by the advance of civilization, the timber was everywhere encroaching on them. Among the facts which he offered in proof of this, was a reference to page 505 of the Seventh Report of the Geological Survey of Indiana, where Dr. Schneck shows how land which was once grassy prairie, is now covered with a luxuriant growth of forest trees; to the evidence of Major Hotchkiss, Geologist of Staunton, Virginia, that the Shenandoah Valley, now heavily timbered, was clear of trees in the early history of Virginia; to the discovery of buffalo bones, in caves near Stroudsburg, Pa., by Dr. Joseph Leidy,—now a timbered region, the buffalo only existing in open, grassy countries;* and to various traditions of settlers in some valleys now timbered, that the land was originally clear of trees. He pointed out that in all known parts of the United States at the present time, except the arid regions, where only drought loving plants could exist, the natural result of freedom was the succession of forest growth. Seeds were scattered by winds or animals over acres of cleared and; if such land became neglected, these, again seeding in time, extended the forest area continually. The tallest growing vegetation, like trees, crowded out the weaker, and the forest naturally crowded out the lower growing and weaker herbaceous plants. He illustrated this by reference to the neglected cotton fields of the Southern States.

From all this, the speaker said that it was evident that there was nothing in Nature either now or in the past, to prevent the gradual encroachment of the forest over the grassy plains, till long before the white man came here, the whole would have been completely covered by arborescent growth. Were there any artificial causes equal to the exclusion of trees, and yet permitting an herbaceous growth? If we were to sow a piece of land in the autumn with some tree seed and some seeds of annuals, the latter would be up, flower, mature and scatter their seed to the ground before next autumn, and many of these seeds would be

*Since these remarks were made it has been brought to the attention of the author, that the bones may have belonged to the Wood Buffalo.

washed into the earth, or drawn into the earth by insects or small animals. But tree seed would make young trees which would not again produce seed for ten or more years. If now, at the end of this first season, a fire swept over the tract, the seeds of the annuals which had found a slight earthy protection, would come up again the next summer, again seeding and extending the area. The trees would be burned down, and though perhaps many would sprout, successive burnings would keep them confined to one place. In short, under annual burnings, herbaceous plants could still increase their area annually, but trees could never get far beyond the line they had reached when the annual fire first commenced. There could be no doubt that an annual burning in a tract destitute of forest growth, would certainly prevent the spread of timber, or of any plant that required more than a year to mature seed from the time of sowing. Now, if we look at the actual facts, we find that the Indians did annually fire the prairies.

Father Hennepin, the earliest writer on Indian habits, noted that it was the practice in his time. There is little doubt but this practice of annual burning has been one extending long into the past. What object had they in these annual burnings? They must have known that the buffalo and other animals on which they were largely dependent for a living, throve only on huge grassy plains, and that it was to their interest to preserve these plains by every means in their power. Low as their power of reasoning may be, they could not but have perceived that while grassy herbage throve in spite of fires, perhaps improved under the fiery ordeal, trees could not follow on burned land. What could be more natural than that they would burn the prairies with the object of retaining food for their wild animals? If we have no difficulty in reaching a positive conclusion so far, we may now take a glance at the early geological times. Mr. Meehan then referred to the researches of Worthen, Whittlesley and others in Ohio, Illinois and other prairie regions. On the retreat of the great glacier, the higher lands and drift formation were probably high and dry long before the immense lakes formed from the melting and turbid waters ceased to be.

It was tolerably well understood that many species of trees and other plants which required a temperate atmosphere, retreated southwardly with the advance of the glacier, and advanced to higher latitudes on the glacier's retreat. Thus these higher ridges would become timbered long before the lower lands became dry. Evidence accumulates that man existed on this continent, in the far west, not long after the glacier retreated, though "not long," in a geological sense, may mean many hundreds of years. The lakes of glacial water would gradually become shallower from the deposit of the highly comminuted material brought down from higher land, from the wearing away of rocky breastworks as in South Pass, Illinois, as well as from the opening which would continually occur from nature's ever varying plan of streams under ground. In all events, the drying of these lakes would be from their outward edges first. Aquatics would give way to marsh grasses, and these to vegetation such as we now find generally spread over the prairie region. If now we can conceive of human beings such as we know

the Indian races to be, already in more southern latitudes—having learned the fact that firing would keep down trees and aid in the preservation of the chase—following the retreat of the glacier to the higher lands, and still as they advanced northwardly, firing the plains up to the water's edge, it would certainly account for the absence of arboreal vegetation from these immense lacustrine lands from the very beginning of their formation. Of course with this view we should have to look for some evidences of man's existence, both on the lands which were once under water, as well as those which were timber lands at his first appearance there. He did not know how many such evidences have been or may be found. Man's traces in the past are at best but rare, and they would naturally be much more scarce in lacustrine regions than in lands dry at the same epoch. At any rate, this part of his remarks, he said, must be taken as mere speculation; but, as we could see on the basis of sound scientific investigation why there could be no trees on these grassy prairies within the range of indubitable history, it was a fair inference that some such cause had continued from the beginning; namely, that annual fires had ever been the reason why arborescent vegetation had never had an existence there.

GEOGRAPHY.

UNITED STATES ARCTIC COLONIZATION AND EXPLORATION IN 1881.

The United States has no less than six Arctic Expeditions in progress, at the present time, under Governmental control and direction. It is the only Government that has actually taken the field in this direction, although most of the leading European nations, inspired by such activity here, are preparing for coöperation next year.

These expeditions are divisible into two classes: one comprising those sent out for purposes of exploration and scientific research, and the other comprising those sent out for humanitarian purposes only.

The "Jeannette," the "Howgate" or "Lady Franklin Bay" and the Point Barrow Expeditions belong to the first-class, and those of the Rodgers, Alliance and Corwin to the second-class.

Those in the first-class differ again, and, most essentially in the principles upon which they are conducted; that of the Jeannette being naval and dependent for success upon the ability of the ship to penetrate the ice to high latitudes and return in safety; while those to Lady Franklin Bay and Point Barrow are to establish permanent stations or colonies, where work is to be steadily carried on from a fixed basis and a vessel used only as a transport and auxiliary means of assistance.

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It will be interesting to watch the operations of the two plans and compare the results.

In this paper it is proposed to give a brief summary of the different expeditions for future reference, the data being drawn in most instances from official sources.

THE HOWGATE OR LADY FRANKLIN BAY EXPEDITION.

The following official documents show the action of the Government to date in connection with this expedition:

AN ACT *to Authorize and Equip an Expedition to the Arctic Seas.*

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States be, and he hereby is, authorized to establish a temporary station at some point north of the eighty-first degree of north latitude, on or near the shore of Lady Franklin Bay, for purposes of scientific observation and exploration, and to develop or discover new whaling grounds; to detail such officers or other persons of the public service to take part in the same as may be necessary, and who are willing to enlist for such purpose, not exceeding fifty in number, and to use any public vessel or vessels that may be suitable for the purpose of transporting the members of said station and their necessary supplies, and for such other duty in connection with said station as may be required from time to time: *Provided*, That the President of the United States is authorized to accept from H. W. Howgate, and fit out for the purposes of this expedition, the Steamship *Gulnare*, which vessel shall be returned to its owner when the objects of the expedition shall have been accomplished, or when, in the opinion of the President, its services are no longer required: *Provided further*, That the United States shall not be liable to any claim for compensation in case of loss, damage, or deterioration of said vessel from any cause, or in any manner whatever, nor be liable to any demand for the use or risk of said vessel.

Approved May 1st, 1880.

For securing this Congressional action, the friends of Arctic enterprise are under especial obligations to the Hon. J. R. McPherson, U. S. Senator from New Jersey, Chairman of the Senate Committee on Naval Affairs; to the Hon. W. C. Whitthorne, Member of Congress from Tennessee, and Chairman of the Committee on Naval Affairs in the House of Representatives, and to the Hon. Omar D. Conger, then a Member of the House, from Michigan, and now a Senator from the same State.

WASHINGTON, D. C., May 1, 1880.

To the President:

SIR,—I have the honor to tender herewith the Steamship *Gulnare* for the purposes set forth in the Act of Congress entitled: "An Act to Authorize and Equip an Expedition to the Arctic Seas."

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This vessel is now at the ship-yard in Alexandria, Va., being strengthened for ice navigation, and can be got ready for sea by the 15th of May, *proximo*, the date upon which it is desirable that the expedition should sail.

Very respectfully, your obedient servant,

H. W. HOWGATE.

EXECUTIVE MANSION, WASHINGTON, MAY 1, 1880.

Captain H. W. Howgate, United States Army, Washington, D. C.:

DEAR SIR,—Your communication of this morning is at had, and the very generous proffer which it contains, of the Steamship *Gulnare* to the United States, for the purposes of the important expedition into the Arctic regions which you have recently projected, is hereby accepted, in pursuance of the authority conferred upon me by Act of Congress, approved this day, entitled "An Act to Authorize and Equip an Expedition to the Arctic Seas."

In connection with this acceptance I desire to express to you my appreciation of the persevering devotion and untiring zeal with which you have labored for the success of this undertaking. It will be a source of patriotic pride if to American enterprise and generosity the honor may yet be due for the practical solntion of the important scientific problem which is the object of the expedition, and which has for so many years engaged the attention of the scientific world.

I trust your efforts may be crowned with success.

Sincerely, R. B. HAYES.

MEMORANDUM.

It is proposed to have the expeditionary vessel ready for sea on or about May 15th, provided, the necessary men and supplies are promptly furnished.

The crew of the vessel will consist of fifteen officers and men, as follows:

One captain, two mates, two engineers, one steward, two firemen and *seven* seamen. These men, and their necessary supplies, are to be furnished by the Navy Department; the men being enlisted for this especial service, as provided in the act. The officers may be commissioned officers of the Navy, or experienced sailors employed for this purpose. The use of the vessel is to be limited to the transportation to Lady Franklin Bay of the permanent exploring and scientific parties, with their necessary supplies. Having landed these, the vessel will return to the United States. It is estimated that the round trip will be made within a period of five months, and an annual visit to the site of the colony or station is contemplated, until it shall be withdrawn or abandoned.

The Navy Department will furnish coal for the several voyages, and will also furnish such articles of outfit and equipment for the vessel as can be supplied, and are required.

The permanent party will consist of officers and men detailed from the army, and who will act under the instructions of the Secretary of War.

The supplies for these men—such as food, clothing, shelter, means of transportation, medicines, arms, &c., will be supplied by the several bureaus of the

War Department, upon requisition from the officer in immediate charge of the expedition. The detail is desired of certain selected men now in the service, whose places in their present commands may be filled by the enlistment of an equal number of new recruits. It is requested that these selected men, fifteen in number, with an officer, also selected, be ordered by telegraph to report in person to the Secretary of War, in Washington, not later than the 10th *proximo.*

Approved: R. B. HAYES.

EXECUTIVE MANSION, APRIL, 28, 1880.

Before the *Gulnare* was fitted for sea, difficulties arose with the Navy Department which led to the partial withdrawal of Government aid, but the vessel went as far north as Disco, and left there two members of the permanent party, Dr. Octave Pavy and Mr. Henry Clay, with supplies, etc., and then returned to the United States.

Congress, at its last session, provided for the continuance of the work in the following language:

"Observation and exploration in the Arctic Seas: For continuing the work of scientific observation and exploration on or near the shores of Lady Franklin Bay, and for transportation of men and supplies, to said location and return, twenty-five thousand dollars."

The appropriation was made under the head of the War Department, and the immediate execution of the law was intrusted by the Secretary of War to the Signal Office.

Lieut. A. W. Greely, A. S. O., was assigned to the command, in the following order, which also prescribes the details of the expedition:

GENERAL ORDERS, NO. 35, OF THE ARMY, April 12th.

In order to carry into execution the act approved May 1, 1880, and so much of the act approved March 3, 1881, entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1882, and for other purposes," as provides for "observation and exploration in the Arctic Seas; for continuing the work of scientific observation and exploration on or near the shores of Lady Franklin Bay, and for transportation of men and supplies to said location and return, $25,000," it is ordered. 1. First Lieutenant A. W. Greely, Fifth U. S. Cavalry, acting signal officer, having volunteered for the expedition, shall take command of the expeditionary force, now organizing under said act, to establish a station north of the 81st degree of north latitude, at or near Lady Franklin Bay, for the purpose of scientific observation. 2. Lieutenant Greely shall have authority to contract for and purchase within the limits of the appropriation, the supplies and transportation deemed needful for the expedition; and the appropriation for this purpose, made by the act approved March 3d, 1881, shall be drawn from the Treasury and disbursed, upon proper vouchers, by the regular disbursing officer of the Signal Service, under the direction of the chief signal officer. 3. The force to be employed in the expedition

shall consist of two other officers, who may volunteer their services; twenty-one enlisted men, who may volunteer from the Army or be especially enlisted for the purpose, and one contract surgeon. The latter to be contracted with at such time as he may be able to join the party. 4. The commander of the expedition is authorized to hire a steam sealer or whaler to transport the party from St. Johns to Lady Franklin Bay, for a fixed sum per month, under a formal contract that shall release the United States from any and all responsibility or claim for damages, in case the steamer is injured, lost or destroyed. The said contract shall include the services and subsistence of the crew of the vessel, and shall require that the said crew shall consist of one captain, two mates, one steward, two engineers, two firemen, and seven seamen—not less than fifteen in all. Such steam sealer or whaler shall not be hired until it has been inspected by an officer, to be detailed by the Secretary of the Navy for that purpose, and found by him fit for the intended service. 5. The expeditionary force shall be assembled at Washington, District of Columbia, not later than May 15th, and at St. Johns not later than June 15, 1881. 6. During their absence on this duty, Lieutenant Greely, and the other officers of the Army accompanying the expedition, will retain station at Washington, District of Columbia. The enlisted men who may volunteer or be specially enlisted for this duty shall receive the pay and commutation allowances (except commutation for quarters and fuel) that accrue to men detached for duty in Washington, District of Columbia. 7. The several bureaus of the War Department will furnish, on requisitions approved by the Secretary of War, the necessary subsistance, clothing, camp and garrison equipage, transportation to St. Johns, New Foundland, and return, medicines, books, instruments, hospital stores, arms and ammunition. The subsistence stores to be furnished as above directed are for sale, not for issue, to the officers and men of the expeditionary force.

In view of the general interest on the subject of the Jeannette, Lieutenant Greely suggested the desirability of sending out a sledge party to Cape Henry to look for traces of the vessel or crew. The correspondence on the subject is as follows:

WASHINGTON, April 4, 1881.

To the Honorable the Secretary of the Navy, through the Secretary of War:

SIR,—I notice in the proceedings of the Jeannette Relief Board the following extract from Captain DeLong's letter: "If I find we are being carried east against our efforts to get north I shall try to push through into the Atlantic by way of the east coast of Greenland if we are far enough north." In this connection the following extracts, showing a northeasterly current, are of interest:

Her Majesty's Ship Discovery, 1779. Beset in 69 degrees North, near Behring's Straits. Drifted to northeast one-half mile an hour.

Captain Beechy, 1828, remarks: "Near Point Barrow it (the current) ran at the rate of three miles an hour and upward to the northeast."

Her Majesty's Ship Enterprise, in 1851 found the mean set of current for seven days near Point Barrow was nine-tenths of a mile per hour and almost invariably to the east- northeast.

Dr. Simpson remarks: "Again in the latitude of Icy Cape the earth's rotation gives them an easterly set, forming an almost constant current along the north coast of America to Point Barrow, whence it pursues a direction to the northeast."

Sir R. McClure says: "The current along the coasts of the Polar Sea appear to be influenced in their direction more or less by the winds, but certainly on the west side of Baring's Island there is a permanent set to the eastward, at one time as much as two knots during a perfect calm."

The drift of a vessel beset by ice depends largely on the prevailing winds. As stated in my testimony before the Jeannette Relief Board, the prevailing winds to the northward of Behring Strait were westerly the winter previous to the Jeannette's entry into the Arctic Sea, which is the general direction. The winds, as observed at Floeberg Beach, 82° 27′ north, 61° 22′ west, the winter of 1875–6, were sixty-four per cent westerly, as were sixty per cent of the winds experienced by Lieutenant Aldrich in his journey of 125 miles to the westward of Floeberg Beach. These facts suggest the possibility of such a contingency as that referred to by Captain DeLong, that he might force his way or drift to Robeson's Channel.

The object of this communication is to ascertain whether you deem it of sufficient importance that I should send from the international polar station at Lady Franklin Bay, a sledge party at the earliest moment practicable to Cape Joseph Henry, in order to see if any vessel is in sight therefrom. Near Cape Joseph Henry a mountain, some 2,300 feet high, affords a wide view. The chances of any discovery are, of course, very remote, but it might be well to spare no pains even for this faint hope. I may add that the distance is but about ninety miles from Lady Franklin Bay and that the trip can be readily made. I shall be pleased to carry out any suggestions or instructions in this respect which may seem advisable to the honorable Secretary of the Navy.

Very respectfully your obedient servant,

A. W. GREELY,

First Lieut. 5th U. S. Cavalry, Acting Signal Officer, U. S. Army.

REPLY OF SECRETARY HUNT.

NAVY DEPARTMENT, WASHINGTON, April 9, 1881.

Hon. Robert T. Lincoln, Secretary of War:

SIR,—I have honor to acknowledge the receipt through you of a communication addressed to me on the 4th inst., by Lieutenant A. W. Greely, who has been assigned to the command of the expeditionary force to be sent to Lady Franklin Bay under the direction of the War Department, in which he proposes, if this Department considers it of sufficient importance, to send from the interna-

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tional polar station at Lady Franklin Bay a sledge party at the earliest moment practicable to Cape Joseph Henry to look after the Jeannette or other vessels missing.

The proposition of Lieutenant Greely meets with the hearty concurrence of this Department and is considered an eminently commendable one on his part.

The department has no particular suggestions to make that would be of value to Lieutenant Greely, but encloses for his information a copy of a communication from Rear Admiral John Rodgers, who was president of the Jeannette Relief Expedition Board, in relation to the proposed co-operation of Lieutenant Greely.

Very respectfully, WILLIAM H. HUNT,
Secretary of the Navy.

REAR ADMIRAL RODGERS' SUGGESTION.

In the letter of Rear Admiral Rodgers, referred to by Secretary Hunt, he says:

Cape Joseph Henry in is one of the passages given by Arctic maps as leading from Herald Island into Baffin's Bay, and is, consequently, in the route in which the Jeannette may have been carried by the ice, even though she had not chosen it. So many abandoned whalers have been forced by the northeast current in the same direction that some of them may be found there, even should the Jeannette not be in that direction.

Captain Cogan said, in his examination before the Board, that when the Jeannette passed into the ice near Herald Island a current which, at certain seasons, sets northwest in that locality, had already began to run, and that the Jeannette would be carried northwest by the ice, he thought.

The United States Ship Vincennes, in 1855, found the current running to the northwest, from an anchorage to the northward of Herald Island, so that it is not improbable that the Jeannette may have been carried for some distance to the northwest, and afterward been set to the northeast.

We can only speculate as to her possible position in an unknown sea, with unknown forces acting upon her, and, it may be, constraining her movements, and all the points readily reached should be examined. Cape Joseph Henry is one of the points full of interest, and the offer of Lieutenant Greely should be accepted, I think, with hearty thanks.

The Steam Whaler Proteus, of 688 tons burthen, was chartered by Lieutenant Greely at St. Johns, New Foundland, to transport the party and supplies to Lady Franklin Bay, and sailed from St. Johns, July 7th.

The following orders show the organization of the expedition:

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
WASHINGTON, D. C., June 17, 1881.

SPECIAL ORDERS NO. 97.

1. By direction of the Secretary of War the following named officers and enlisted men are assigned to duty as the expeditionary force to Lady Franklin

Bay: First-Lieutenant A. W. Greely, Fifth Cavalry, acting Signal Officer and Assistant; Second-Lieutenant Frederick F. Kislingbury, Eleventh Infantry, acting Signal Officer; Second-Lieutenant James B. Lockwood, Twenty-Third Infantry, acting Signal Officer; Sergeant Edward Israel, Signal Corps U. S. Army; Sergeant Winfield S. Jewell, Signal Corps U. S. Army; Sergeant George W. Rice, Signal Corps U. S. Army; Sergeant David C. Ralston, Signal Corps U. S. Army; Sergeant Hampden S. Gardiner, Signal Corps U. S. Army; Sergeant William H. Cross, general service U. S. Army; Sergeant David L. Brainard, Company L, Second Cavalry; Sergeant David Linn, Company C, Second Cavalry; Corporal Daniel C. Starr, Company F, Second Cavalry; Corporal Nicholas Salor, Company H, Second Cavalry; Corporal Joseph Elison, Company E, Tenth Infantry; Private Charles B. Henry, Company E, Fifth Cavalry; Private Maurice Connell, Company B., Third Cavalry; Private Jacob Bender, Company F, Ninth Infantry; Private Francis Long, Company F, Ninth Infantry; Private William Whisler, Company F, Ninth Infantry; Private Henry Birderbick, Company G, Seventeenth Infantry; Private Julius Fredericks, Company L, Second Cavalry; Private James Ryan, Company H, Second Cavalry; Private William A. Ellis, Company C, Second Cavalry.

2. In accordance with special instructions from the Secretary of War, Lieutenant Greely will contract at Disco, Greenland, with Octave Pavy, M. D., who will thereafter remain on duty as acting signal surgeon U. S. Army, with the expeditionary force.

3. First-Lieutenant A. W. Greely, Fifth Cavalry, acting signal officer and assistant to the Chief Signal Officer, is hereby assigned to the command of the expedition, and is charged with the execution of the orders and instructions given below. He will forward all reports and observations to the Chief Signal Officer, who is charged with the control and supervision of the expedition.

In addition to the persons named above, Mr. Henry Clay, accompanies the expedition as volunteer secretary to the officer commanding. Mr. Clay with Dr. Pavy spent the winter in Greenland preparing themselves for work further north.

THE INSTRUCTIONS:

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
WASHINGTON, D. C., June 17, 1881.

INSTRUCTIONS NO. 72.

The following general instructions will govern in the establishment and management of the expedition, organized under Special Orders, No. 97, War Department, office of the Chief Signal Officer, Washington, D. C., dated June 17, 1881: The permanent station will be established at the most suitable point north of the eighty-first parallel and contiguous to the coal seam discovered near Lady Franklin Bay by the English expedition of 1875. After leaving St. Johns, N. F., except to obtain Esquimaux hunters, dogs, clothing, etc., at Disco or Upernavik,

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only such stops will be made as the condition of the ice necessitates, or as are essential in order to determine the exact location and condition of the stores cached on the east coast of Grinnell Land by the English expedition of 1875. During any enforced delays along that coast it would be well to supplement the English depots by such small caches from the steamer's store of provisions as would be valuable to a party retreating southward by boats from Robeson's Channel. At each point, where an old depot is examined or a new one established, three brief notices will be left of the visit; one to be deposited in the cairn built or found standing; one to be placed on the north side of it, and one to be buried twenty feet north (magnetic) of the cairn. Notices discovered in cairns will be brought away, replacing them, however, by copies. The steamer should, on arrival at the permanent station, discharge her cargo with the utmost dispatch and be ordered to return to St. Johns, N. F., after a careful examination of the seam of coal at that point has been made by the party to determine whether an ample supply is really procurable. A report in writing on this subject will be sent by the returning vessel. In case of doubt an ample supply must be retained from the steamer's stores. By the returning steamer will be sent a brief report of proceedings and as full a transcript as possible of all meteorological and other observations made during the voyage. After the departure of the vessel the energies of the party should first be devoted to the erection of the dwelling house and observantories, after which a sledge party will be sent, according to the proposal made to the Navy Department, to the high land near Cape Joseph Henry. The sledging parties will generally work in the interests of exploration and discovery. The work to be done by them should be marked by all possible care and fidelity. The outlines of the coasts entered on charts will be such only as have actually been seen by the party. Every favorable opportunity will be improved by the sledging parties to determine accurately the geographical positions of all their camps and to obtain the bearing therefrom of all distant cliffs, mountains, islands, etc. Careful attention will be given to the collection of specimens of the animal, mineral and vegetable kingdoms. Such collections will be made as complete as possible; will be considered the property of the Government of the United States, and are to be at its disposal. Special instructions regarding the meteorological, magnetic, tidal, pendulum and other observations, as recommended by the Hamburg International Polar Conference, are transmitted herewith. It it contemplated that the permanent station shall be visited in 1882 and 1883 by a steam sealer or other vessel, by which supplies for and such additions to the present party as are deemed needful will be sent. In case such vessel is unable to reach Lady Franklin Bay in 1882, she will cache a portion of her supplies and all of her letters and dispatches at the most northerly point she attains on the east coast of Grinnell Land, and establish a small depot of supplies at Littleton Island. Notices of the locality of such depots will be left at one or all of the following places, viz: Cape Hawks, Cape Sabine and Cape Isabella. In case no vessel reaches the permanent station in 1882 the vessel sent in 1883 will remain in Smith's Sound until there is danger of its closing by ice, and, on leav-

ing, will land all her supplies and a party at Littleton Island, which party will be prepared for a winter's stay, and will be instructed to send sledge parties up the east side of Grinnell Land to meet the party. If not visited in 1882, Lieutenant Greely will abandon his station not later than September 1, 1883, and will retreat southward by boat, following closely the east coast of Grinnell Land until the relieving vessel is met or Littleton Island is reached. A special copy of all reports will be made each day, which will be sent home each year by the returning vessel. The full narrative of the several branches will be prepared with accuracy, leaving the least possible amount of work afterward to prepare them for publication. The greatest caution will be taken at the station against fire, and daily inspections made of every spot where fire can communicate. In case of any fatal accident or permanent disability happening to Lieutenant Greely, the command will devolve on the officer next in seniority, who will be governed by these instructions.

The Lady Franklin Bay Station will form the initial one of the International series, in which the future cooperation of the principal European nations is expected.

THE POINT BARROW EXPEDITION.

This Expedition, like the one to Lady Franklin Bay, is sent out by the War Department, and is under the supervision of the Signal Office. It is designed for permanent work and forms one of the International series of Arctic Stations established by the United States.

A schooner, named the "Golden Fleece," has been chartered in San Francisco to transport the party and supplies to Point Barrow, and then return to the United States.

The following instructions to the commanding officer, give the personnel of of the expedition, and the nature of the proposed work:

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
WASHINGTON, D. C., June 24, 1881.

By direction of the Secretary of War, the following named officers, civilians and enlisted men, are assigned to duty as the expeditionary force to Point Barrow, Alaska Territory, viz: First-Lieutenant P. Henry Ray, Eighth Infantry, acting Signal Officer; Acting Assistant-Surgeon George Scott Oldmixon, U. S. Army; Sergeant James Cassidy, Signal Corps, U. S. Army, Observer; Sergeant James Murdock, Signal Corps, U. S. Army; A. M. Harvard, Naturalist and Observer; Sergeant Middleton Smith, Signal Corps, U. S. Army, Naturalist and Observer; Captain E. P. Herendeen, Interpreter, storekeeper, etc.; Mr. A. C. Dark, Astronomer and Magnetic Observer (coast survey); carpenter, cook and laborer.

First-Lieutenant P. H. Ray, Eighth Infantry, acting Signal Officer, is hereby assigned to the command of the expedition, and is charged with the execution of

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the orders and instructions given below. He will forward all reports and observations to the Chief Signal Officer, who is charged with the control and supervision of the expedition.

As soon as practicable, Lieutenant Ray will sail with his party from San Francisco for Point Barrow, lat. 71° 27′ N., long. 156° 16′ W. (Beechey), and establish there a permanent station of observation, to be occupied until the summer of 1884, when he will return here, unless other orders reach him. On the way out and back a stoppage of a few days only will be made at Plover Bay (lat. 64° 22′ 0″ N., long. 173° 21′ 32″ W.) for the purpose of determining the error and sea rate of his chronometers. The vessel conveying him to his destination will not be detained at the permanent station longer than is necessary to unload the stores.

The general instructions to Lieutenant Ray are the same as given to Lieutenant Greely, of the Lady Franklin Bay Expedition. He is ordered to send his vessel back to San Francisco as soon as possible with a report of the latitude and longitude of his station, and a transcript of observations made on the voyage. Careful attention to the making of animal and vegetable collections is required. It is contemplated that the permanent station shall be visited in 1882, 1883 and 1884 by a steam or sailing vessel, by which supplies for, and such additions to the present party as are deemed needful will be sent. List of stores required to be sent by the next season's vessel, will be forwarded by each returning boat. The subject of fuel and native food-supply, its procurement and preservation, will receive full and careful attention, as soon after the establishment of the post as practicable. Full reports upon this subject will be expected.

The party is expected to leave San Francisco July 15th.

THE JEANNETTE OR BENNETT EXPEDITION.

The steamer Jeannette, owned and equipped by Mr. James Gordon Bennett, of the New York *Herald*, but officered and manned, under a special act of Congress, by the U. S. Navy Department, sailed from San Francisco for the Arctic, via Behring's Strait, July 8, 1879.

The Jeannette was provisioned for a three years cruise, or until October, 1882, until which time no serious apprehension for her safety need be experienced. The vessel was officered as follows:

Lieutenant G. W. DeLong, Commanding; Lieutenant C. W. Chipp, Ex. Officer; Lieutenant J. W. Danenhower, Navigator; G. W. Melville, Chief Engineer; J. W. Ambler, Passed Assistant Surgeon; J. J. Collins, Meteorologist; R. L. Newcomb, Naturalist.

At St. Michaels, Alaska, the Jeannette took on board dogs, sledges, drivers and fur clothing, and then passing through Behring's Strait was last seen September 2, 1879, about ten miles south of Herald Island by Captain Barnes, of the American Whaler Sea-Breeze. On the following day the smoke of a steamer supposed to be the Jeannette was seen near Herald Island by several whalers, but

the vessel itself was not seen. Since that date nothing is known of either vessel or crew, but there appears to be no valid reason for doubting their safety.

After leaving San Francisco, De Long wrote under date of July 17, 1879, "In the event of disaster, we shall retreat upon the Siberian settlements or endeavor to reach natives around East Cape, and wait for a chance to get back to our depot at Saint Michael's. If a relief ship comes up to merely obtain tidings of us, let her look farther on the east side of Wrangel Land, and on Herald Island. If I find we are being carried eastward, *against our efforts to get north*, I shall try to push through into the Atlantic by way of the east coast of Greenland, if we are far enough north; but if we are far south, then by way of Lancaster Sound and Melville Bay."

Captain De Long wrote to his wife at sea, under date of August 17, 1879, that he proposed to proceed north by the way of the east coast of Wrangel Land, touching at Herald Island, where he should build a cairn and leave records, thence landing on Wrangel Land, he should leave records on its eastern coast under cairns at about twenty-five miles apart.

In this connection the following letter from Lieutenant De Long will be of interest:

ARCTIC STEAMER "JEANNETTE,"
AT SEA, Lat. 49° 24′ N., Long. 152° 37′ W.

Capt. H. W. Howgate, U. S. A., Washington, D. C.:

MY DEAR SIR,—Until now, I have had no chance to supplement my telegraphic thanks for your generous contribution of fur clothing, by a word in writing. I desire to thank you in behalf, not only for myself, but of Mr. James Gordon Bennett, who authorized me to accept them for the expedition with his thanks.

Should we meet next year among the floes of the Arctic, we shall be only too glad to share not only *your* clothing but *our* food with our brethren of the Army, and to unite our energies with theirs in planting our flag at least one stage nearer the Pole. Very sincerely yours,

(Signed), GEORGE W. DE LONG,
Lieut. Commanding.

THE "CORWIN" EXPEDITION.

Last year, the Revenue Cutter "Corwin," Captain Hooper commanding, was sent by the Treasury Department on a cruise in Behring Sea and the Arctic Ocean, to search for traces of two missing whalers, the Vigilant and Mt. Wollaston, and incidentally for news of the "Jeannette." Capt. Hooper failed in the principal objects of his mission, but did such excellent work that the Department determined to send him again this year.

The following is a copy of the instructions forwarded to Capt. Hooper:

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WASHINGTON, April 21, 1881.

Capt. C. L. Hooper, Commanding Revenue Steamer Corwin, San Francisco, Cal.:

SIR,—The Department having determined to despatch the Revenue Steamer Corwin under your command to cruise in the waters of Alaska for the enforcement of the provisions of law and protection of the interests of the government on the seal islands and the sea otter hunting grounds and Alaska generally, you are directed to take on board that vessel without delay supplies of provisions for a six months' cruise, and sufficient quantities of fuel and water, and leave San Francisco with your command not later than the 1st *proximo* for the waters named and make the best of your way to the places hereinafter designated. It is desirable that you should be in Behring Sea and the Arctic Ocean as early in the season as the opening of navigation will permit. You will accordingly proceed from San Francisco direct to Ounalaska and on arrival there will take in a fresh supply of coal. From this point you will proceed to the Arctic Ocean, touching at the Seal Islands and at St. Michael's, if practicable, on your way. You will leave an officer and two men on Otter Island for the purpose of protecting the seals there, unless, after conferring with the special agent in charge of the Seal Islands, you should deem it necessary to take all your command with you in your further cruise to the northward. Should you enter Norton Sound, it is expected you will time the movements of your vessel, so as to arrive in those waters before Behring Straits are open for the passage of vessels. Following the instructions for your cruise of last year, governing the illicit traffic with the natives by unauthorized parties, in fire-arms, ammunition and distilled spirits, you will use your utmost endeavors to apprehend any vessels you may find engaged in such illicit traffic and break up their illegal trade.

No information having been received concerning the fate of the whalers, Mt. Wollaston and Vigilant, you will bear in mind the instructions for your cruise of last year, and it is hoped you may bring back some tidings of the missing vessels.

You are further instructed, while in the Arctic, to make careful inquiries regarding the progress and whereabouts of the steamer Jeannette, engaged in making explorations under the command of Lieutenant Commander De Long, U. S. N., and you will, if practicable, communicate with, and extend any needed assistance to, that vessel.

Should you be able to accomplish your mission in the Arctic Ocean early in the season, or find it necessary in carrying out these instructions to return to the Seal Islands before the usual time (say October 10th), for the return of the Revenue Steamer from those waters, you will make a cruise to the westward from Ounalaska as far as Altou, with the general object of protecting the sea otter in hunting grounds and breaking up the business of the illicit traders. You will, in your season's cruise, touch at such places as may be practicable on the main land or islands where there are settlements of natives, and examine into and report upon their condition.

You are permitted, in your discretion, to remain in the Arctic Ocean as late in the season as may be necessary to accomplish the object of your voyage without encountering undue hazard to your command.

While cruising in the Arctic Sea, you will make careful observations as to currents, tides, &c., and will keep an accurate record of such soundings, surveys, &c., as you may be able to make, and you will obtain such information as may be practicable regarding the numbers, character, occupations and general condition of the inhabitants of the adjacent coasts.

It is hoped that in your Arctic cruise you may be able to make use of coal from the mines located and opened by you last season, and you are authorized, should you deem it advisable, to ship, in the capacity of ordinary seamen, two or three persons skilled in coal mining, whose services you may make use of in getting out a supply from the mines above mentioned. You are also authorized to purchase any implements which may be necessary for the purpose.

Previous to sailing from San Francisco, you will forward to this department a muster and descriptive roll of officers and men of your command. You will, whenever opportunity presents, transmit to the department reports of the progress of your cruise.

In conclusion, the department, having defined the general objects of your voyage and relying upon your skill and good judgment, confides to your discrecretion the details of your cruising within the Arctic Ocean, and takes pleasure in wishing you a prosperous voyage and a safe return.

Very respectfully, WILLIAM WINDOM,
Secretary of the Treasury.

The Corwin sailed from San Francisco May 4th, officered as follows:

Captain, C. L. Hooper, Boston; 1st Lieutenant, W. J. Herring, New York; 2nd Lieutenant, E. Burke, Milwaukee; 3rd Lieutenant, O. B. Myrick, Boston; 3rd Lieutenant, George H. Doty, New York; 3rd Lieutenant, William E. Reynolds, Washington; Chief Engineer, James T. Wayson, Baltimore; 1st Assistant Engineer, Charles A. Lawes, Philadelphia; 2nd Assistant Engineer, Frederik E. Owen, Oswego, N. Y.; Surgeon, I. C. Rosse, Washington.

She is provisioned for a nine month's cruise, but if Captain Hooper decides to winter in the Arctic he will be furnished with additional supplies by the Alaska Commercial Company.

The Corwin reached Ounalaska, May 17th, and sailed thence for the Arctic, after making a few needed repairs, May 22nd.

THE RODGERS OR JEANNETTE SEARCH EXPEDITION.

The bill making appropriations for Sundry Civil Expenses of the Government, for the fiscal year ending, June 30, 1882, contained the following clause:

To enable the Secretary of the Navy to immediately charter or purchase, equip, and supply a vessel for the prosecution of a search for the steamer Jeannette of the Arctic Exploring Expedition (which the Secretary of the Navy is

hereby authorized to undertake), and such other vessels as may be found to need assistance during said cruise, one hundred and seventy-five thousand dollars: Provided, That said vessel shall be wholly manned by volunteers from the Navy.

As soon as practicable after the passage of this act, the Secretary of the Navy convened a board of naval officers to consider the directions of the search, the means best adapted for it, and the details of the search expedition when ordered.

The following is the report of the board:

WASHINGTON, March 26, 1881.

Hon. William H. Hunt, Secretary of the Navy:

SIR,—The "Jeannette" Relief Board has the honor to make the following report in regard to the matters embraced in your instructions of the 10th inst. You refer three main objects to the consideration of the Board.

First, The direction of the search. To ascertain the direction of the search it is proper to find where the "Jeannette" proposed to go. The captain, in a letter to his wife, written at sea, August 17, 1879, said that he proposed to proceed north by the way of the eastern coast of Wrangel Land, touching at Herald Island, where he should build a cairn and leave records, thence landing on Wrangel Land and leaving records on the eastern coast under cairns at about twenty-five miles apart.

While in pursuance of this plan apparently he was seen by the whaler "Sea Breeze" on the 2d of September, 1879. Captain Barnes, in command of the "Sea Breeze," said she was about fifty miles south of Herald Island. The vessels were only about six miles apart. The sea was comparatively clear of ice where the "Sea Breeze" was, but the "Jeannette" was seen entering a lead or channel through thick ice, steering up toward Herald Island. Next day thick, black smoke was seen to be issuing from her smoke-stack, but the hull was invisible below the horizon. The "Jeannette" left San Francisco with anthracite coal, but at Ounalaska took in 150 tons of bituminous coal.

The whalers "Vigilant" and "Mount Wollaston" were last seen October 10, 1879, about eighty miles northeast by east from the spot where the "Jeannette" was seen on October 2 and 3, 1879. The "Mount Wollaston" and "Vigilant" were together. The "Mercury" and the "Helen Mar" were near them.

The two first named vessels sailed off to the northwest; the other two did not change their place. In a few hours the ice, under the influence of a sudden change of temperature, owing to a northwest breeze, began making and grew so fast that in twelve hours it had become some six inches in thickness. The "Mercury" and "Helen Mar" recognized their danger. The crew of the "Mercury" abandoned their vessel and went on board the "Helen Mar" as the newer and more able vessel, and in her the crews escaped to clear water, after sailing some sixty miles through ice. The "Mercury" has not since been seen.

The "Mount Wollaston" and the "Vigilant," with their crews, numbering about thirty people each, have not since been heard from. They were in full probability caught in the ice, which formed so suddenly around the other vessels, and did succeed in breaking their way out.

The meteorological records of the Arctic for 1879, though not complete, show that in September and October strong gales prevailed, such as would render very perilous the situation of vessels caught in the pack ice and protected by no harbor. Captain Cogan saw a very heavy pack, he thought one hundred feet thick, through which the missing vessels would have to make their way and against which they would have to defend themselves, unless they were fortunate enough to get into some harbor. Against such immeasurable force as thick pack ice, driven by a current, skill in handling a vessel would avail nothing. The ship would be carried with the ice. No floating structure made by man could resist it, and, as the coast was encumbered with ice, there seems little probability that they made a harbor. But in case the vessels were lost the crews might make their way over the ice to Wrangel Land, where only they can be sought, since the Arctic is too vast to be explored with any rational hope of success in finding the vessels, except upon some definite information as to whither they were driven.

But the information of the purpose of Captain DeLong to land on Wrangel Land is very definite. He proposed to land there frequently and to build cairns. On Wrangel Land, then, and on Herald Island, where he proposed to go, information of him is to be sought.

Captain Cogan said before the Board that the "pack ice around Herald Island was such as would keep the 'Jeannette' from landing, since, even though they succeeded in sending parties over the ice, it would take them a good while, their vessel would be drifting off all the time and they could not get back. They could not steam back and hold their place; they could not hold up against that ice. The 'Jeannette' was in the ice and going along with it. It enclosed her, for she steamed right into it. I do not think it would be proper to send people away from her, as they might not be able to get back."

From all the foregoing it does not seem probable that cairns will be found on Herald Island, and we fear scarcely on Wrangel Land. It will be proper to look for them, however.

"In the event of disaster to the ship," says Captain De Long, in his letter of July 17, 1879, after leaving San Francisco, "we shall retreat upon the Siberian settlements or the natives of around East Cape, and wait for a chance to get back to our depot at St. Michaels. If the ship comes up merely for tidings of us, let her look further on the east side of Kellett Land and on Herald Island. If I find we are being carried east against our efforts to get north I shall try to push through into the Atlantic by way of the east coast of Greenland if we are far enough north, and if we are far south, then by way of Lancaster Sound and Melville Bay."

Captain Cogan, who has a very high reputation for experience and intelligence in Arctic matters, saw the pack ice into which the "Jeannette" had gone

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the day before his arrival. He estimated its thickness at about one hundred feet. He said the current had already commenced running northwest at the rate of about twenty miles a day, and this current was carrying the ice in the same direction. Captain Cogan's remarks are worth quoting: "There appears to be a strait between Wrangel Land and some land to the northeast that forms a kind of sluice-way, and when there is ice on both sides there will be a little stretch where the current runs about twenty miles a day, so that in whaling we have to run south every day after that hole opens, to hold our position. In cutting in a whale to the south coast of Herald Island, I found we were drifted twenty miles to the northwest. If you get further to the eastward of Herald Island, you get out of this current."

He says: "I did not see the smoke of the 'Jeannette.' I was there when they reported smoke, but I did not call it smoke. I think it was frost rising from the holes in the ice. There were twenty different places where it looked as if smoke was rising. I did not call it smoke, but it might have been."

The smoke, however, is unimportant. The captain of the "Sea Breeze" saw the "Jeannette" the day before the smoke was reported. Nor would a whaling captain mistake the "Jeannette" steamer, plainly seen, for a whaler. What the captain of the "Sea Breeze" saw, was undoubtedly the "Jeannette." Her smoke was reported, on the 6th of September, further north than when seen by the "Sea Breeze;" but if this was really her smoke it only proves that she was still going to Herald Island, which we should naturally assume without proof.

As preliminary work, the "Mary and Helen" should visit Petropaulovsky for Arctic clothing, for dogs, sledges and dried salmon for dog food. Thence to St. Michaels, to St. Lawrence Bay, to East Cape, to Cape Serdge Kamen, to Kumotschin Bay for tidings of the "Jeannette," to Herald Island; thence to the southeast coasts of Wrangel Land for cairns or other notices and to examine the harbors for wintering quarters on the south or southwest of Wrangel Land or in Siberia near some Tchuktchi village.

To give time for visiting the various places named the "Mary and Helen" should leave San Francisco about June 1st, so as to arrive at Herald Island near the middle of August, for it does not appear that any earlier arrival will be useful It is only late in the season that the ice leaves Wrangel Land.

Congress, it appears, had no will to risk another exploring vessel. (See Commodore Jeffers' letter appended.) The "Mary and Helen" should not be caught in the ice away from a harbor, except from accident beyond control. If she winters on the southeast coast of Wrangel Land or on the southern shore she would easily return home next year, after having usefully spent her time available for the purpose in examining the coast by means of sledge journeys.

Second, "The means best adapted to the search."

The available means best adapted to the search is the employment of the "Mary and Helen," fully officered, thoroughly supplied with stores and the nec-

essary appliances, such as sledges, with twenty-five dogs in all, with natives to drive them.

The "Mary and Helen" is new, strong, and has a speed of eight knots under steam and is faster under canvas. It is believed that the "Mary and Helen" is the only fit vessel which could be procured in time for the search after the appropriation was made.

It would have been better, perhaps, had the propeller been made to hoist and the rudder to unship readily, but special provision had been made for strengthening these parts, so that in practice the "Mary and Helen" is the very best means within reach of the Government. She was specially built for Arctic navigation.

Third, "The details of the search expedition."

The details have been carefully considered and will be found in the appendix, giving ample clothing lists, the Navy ration for two years, with other food added, amounting in all to supplies which can be made to last three years, with suggestions from the Surgeon-General of the Navy in regard to scurvy, snow-blindness and such other matters as occur to him as useful.

Suggestions are added by the Board to guide the shipping officer in the physical selection of fit men for the peculiar service.

A list of medical supplies, a list of articles for trade with the natives, an officer list and a crew list are also included.

It would be advantageous, probably necessary, to have coal (say 200 tons) landed at St. Michaels to fill up the vessel previous to entering the Arctic circle. At St. Michaels the Signal Service will have a meteorologist stationed, and the Alaska Fur Company have there a trading station.

A letter should be obtained from the Russian government, either through the Russian minister at Washington or through our minister at St. Petersburg, so that the necessary facilities may be extended from the commanding officer in Petropaulovsky to the captain of the "Mary and Helen," the better to enable him to make such purchases as he may desire for the purposes of the expedition.

Dogs and sledges have been mentioned in the outfit, with a couple of drivers from Petropaulovsky and some natives from the Tchuktchis as drivers, as hunters and as men experienced in traveling over ice.

The drawing made by Captain Thomas Long, of the bark "Nile," of Cape Hawaii, on the coast of Wrangel Land, indicates a formation of outlying islands, making fiords inside of them. Captain Cogan speaks of "quite a harbor on the southeast end. Whether this southeast end is an island or a deep bay, like St. Lawrence Bay, I am not sure."

Accordingly, some harbor on the southern or southeastern end of Wrangel Land has been selected as offering far greater advantages than any other for examining the locality where the people of the "Jeannette" and of the missing whalers are to be sought if their vessels have been abandoned." But failing in this purpose of getting into such harbor, the "Mary and Helen" should find some secure place in Siberia for wintering as near to Wrangel Land as is possi-

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ble, for the purpose of making sledge journeys on the coast of Wrangel Land, if it be possible to cross the strait.

The sledge journeys, from what we can learn of the ice which fringes Wrangel Land, seem the most ready means of carrying out the purpose of the expedition —namely, that of succoring the "Jeannette" and the whalers' people, without inordinate risk of losing the vessel sent to help them.

The mission of the "Mary and Helen" will be finished when she has examined the points indicated and has extended what help can be given and obtained, by means of sledge journeys, all the information which can be had of the missing people and vessels. She is not to winter in the Arctic except to promote the search for which she is sent out, nor then, except in a secure harbor: nor is she to remain more than one winter away from home. Whatever instructions may be given, it should be clearly understood that much must be left to the judgment of the commanding officer. It is impossible to foretell the exigencies which may arise and which may demand other action than that which has been provided for.

In conclusion, the Board would add that the whole history of Arctic exploration is marked by great dangers, by wonderful escapes, by success where appearances forbade any rational hope. We will believe that the "Jeannette" and her gallant crew are safe until we shall know that disaster has occurred. In the North men are full of energy and courage, and so far necessity for action has never failed to bring forth daring skill, nearly always with admirable results.

We have the honor to be your obedient servants,

JOHN RODGERS,
Rear-Admiral and Prest. of the Board.

JAMES A. GREER,
Captain U. S. Navy, member.

A. S. KENNY,
Paymaster U. S. Navy and member.

J. H. KIDDER,
Surgeon U. S. Navy and member.

H. C. WHITE,
Lieut-Com'der U. S. Navy and member.

WM. P. RANDALL,
Lieutenant U. S. Navy and member.

R. M. BERRY, Lieutenant U. S. Navy, member and Recorder.

The department, having no ship available, purchased the steam whaler Mary and Helen, then lying in San Francisco harbor, paying for it the sum of $100,000. The name of the vessel was formerly changed to the Rodgers, and it was sent to the Man Island Navy Yard for equipment and outfit, under the supervision of Lieutenant R. M. Berry, who had been assigned to the command of the expedition.

In connection with the price paid for the vessel, the following letter from her builders will be of interest:

OFFICE OF GOSS, SAWYER & PACKARD,
SHIP BUILDERS,
BATH, MAINE, September 30, 1879.

Captain H. W. Howgate, U. S. A., Washington, D. C.:

DEAR SIR,—In reply to your esteemed favor of September 10th, would say that it would cost (independent of engines and machinery) to build a similar vessel to the steam whaler Mary and Helen, $17,000, complete.

The engines and boilers would probably cost $8,000. Owing to advance in price of materials and labor, we have had to advance in our prices for building.

Yours very truly,

(Signed), GOSS, SAWYER & PACKARD,

P. S.—Your letter did not reach us until last evening. G. S. & P.

The following brief instructions were given Lieutenant Berry by the Secretary of the Navy, under date of May 20, 1881:

"You will pursue as nearly as practicable the course recommended by the Board of which Rear Admiral John Rodgers was President, for the search you are about to undertake. You will report to the Department your progress and the condition of your vessel and command, by every available channel of communication during your voyage, making your reports as full and detailed as practicable. In the pursuit of your adventurous and arduous voyage, you carry with you the sympathy and entire confidence of the Department. Nothing that can be done to contribute to your well-being and success shall be omitted. As soon as you are ready you will sail. The eyes of your fellow-countrymen, and of the scientific men of all the world, and especially of those interested in Arctic explorations, will follow you anxiously in your way through the unknown seas to which you go. May Heaven guard and bless you, and your officers and men, and crown your heroism with success and glory.

Very respectfully W. H. HUNT,
Secretary of the Navy."

The Rodgers dropped down to San Francisco from Man Island on June 6th, and on the evening of that date, her officers were given a brilliant reception by the California Academy of Sciences, when papers were read by Mr. Charles Wolcott Brooks and Mr. James Gamble, and remarks made by Lieutenant Berry, Professor Davidson and Captain Howgate.

The occasion was a pleasant one, and the members present evidenced the deep interest taken on the Pacific coast in the subject of Arctic Exploration.

The Rodgers was delayed for several days waiting for the arrival of a portion of her supplies and a change in her personnel, made necessary by the illness of one of the officers, but finally sailed on June 16th, officered and manned as follows:

Lieutenant Robert M. Berry, U. S. N., Commanding; Howard Scott Waring, Master, U. S. N., Executive Officer and Navigator; Dr. Meredith Dabney

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Jones, U. S. N., Passed Assistant Surgeon; Charles W. Putnam, Master, U. S. N.; Abraham V. Zane, U. S. N., Passed Assistant Enginees; Henry Jackson Hunt, U. S. N., Ensign; George Middleton Stoney, U. S. N., Ensign; Dr. Joaquim Demetrius Castillo, U. S. N., Assistant Surgeon; Colonel Wm. H. Gilder, Pay Clerk, and New York *Herald* correspondent, (was with Lieutenant Schwatka's expedition to King William's Land); Joseph Hodgson, Paymaster's yeoman and storekeeper, Scoby Willard Morrison, Geo. Gardner, Jr., Patrick Cahill, machinists; Herbert P. de Tracy, acting carpenter. Also, one steward, two cooks, three firemen and fifteen ablebodied seamen.

The vessel is provisioned for four years, and bountifully supplied with reading matter.

THE ALLIANCE SEARCH FOR THE JEANNETTE.

The U. S. S. Alliance, under date of May 27th, was ordered to be prepared with all dispatch to proceed on a cruise in search of the "Jeannette," between Greenland, Iceland, and the coast of Norway, and as far as the northern coast of Spitzbergen, if it is possible to get there without endangering the vessel. Before sailing the bow of the Alliance was encased with live oak, two inches thick, extending from the stem thirty-five feet aft, with a strong iron guard to protect the vessel against drift ice.

Her commander was directed to take a pilot at St. Johns, New Foundland, who was familiar with the coast of Iceland, and at Hammerfest, in Norway, one familiar with the coast of Spitzbergen; and again upon his arrival off the coast of Spitzbergen, to obtain from the walrus and seal hunters some one who can pilot the ship along that coast and into the best harbors. The Secretary says; "If the Jeannette should possibly get through from the direction anticipated she would probably sight Spitzbergen and make for the coast of Norway. You will therefore cruise backward and forward between Greenland and Spitzbergen as much as possible under sail" The vessel is not to remain longer than September 25th, not being fitted for Arctic exploration, but simply as a relief ship.

The Alliance under command of Commander Geo H. Wadleigh, sailed from Norfolk, Va., June 16th; reached St. Johns, N. F., June 24th, and sailed thence June 29th.

Belgium promises to become the great industrial teacher of Europe. Many foreigners are now attending her schools. She has fifty-nine technical schools, thirty-two industrial schools, and a higher commercial school—all receiving funds annually from the State.

PHILOSOPHY.

THE INFLUENCE OF MODERN SCIENCE UPON BELIEF IN MIRACLES.

BY C. C. KIMBALL, D. D., KANSAS CITY, MO.

This is an important and interesting topic. If, as is claimed, the tendency of modern science is to exalt natural law to a pitch of rigidity, who makes all miracles incredible, and reasonable people are to be denied the privilege of contemplating what they regard as the best authenticated fact in history—the resurrection of Christ—then Christianity is disproved, and the church of Christ certain to dissolve and perish.

Will the progress of scientific knowledge lead to this result?

To discuss a topic like this, without accurate definitions, is wasted labor. Without clear-cut definitions we are like persons standing on cloud capped mountains. We can see scarcely so far as our feet; but with the sharp definitions, the clouds are torn away and we can see both earth and heaven.

In order to understand the supernatural, we must first inquire

WHAT IS THE NATURAL?

It is that which God does by a usual, settled and regular procedure. It is the habitual way of God in the world about us. Unless God's methods were uniform, life would be confused and intolerable. If, for example, vaporizing water by heat would not always, but only occasionally, generate force, who would build a locomotive or a railway.

If water, falling on the wheel, would only now and then cause it to revolve, who would build the mill beside the rapidly descending stream?

If we did not know at any time whether fire would warm or freeze us, confusion would follow. But depending as we can on the settled ways of God, which we call the laws of nature—gravitation, heat, light and the like, we have a sure basis for industry and civilization.

WHAT IS THE SUPERNATURAL?

It is not God's settled and regular procedure, on which society and industry rest so securely, but his exceptional, unusual and special action in human affairs, interrupting for good reason the regular sequence of cause and effect. God was perfectly free to create the universe and assign to it fixed and regular laws. He is equally free, when he sees occasion, to break in upon the arrangement which he has adopted. To compare great things with small, a business man habitually walks to his office every morning. It is the habit or law of his life; but, one morning he breaks the law and goes down town in a carriage. He had satisfactory reasons for walking, and at last, he has equally satisfactory reasons for riding

Exactly so with God in the natural and supernatural, or what is the same thing, the habitual and the exceptional.

Generally, of course, he pursues one way, as we see would be best for his creatures, but sometimes his infinite wisdom inclines him to take another method and work what the scriptures call "signs and wonders." He works these miracles only when there is good reason for them, and when there is reason for them, none can prevent him.

But now we come to

A PSYCHOLOGICAL WONDER.

Certain men of materialistic pursuits, chiefly, tell us that they have taken a deep look into what they are pleased to call "Nature," and they do not see reason to believe that God can, in any way, interrupt the system which he has started. They have looked even with a microscope, and do not find a miracle possible. Some find no evidence of the existence of any God or possible interrupter of the universal system of law. Thomas Henry Huxley, for example, though he himself interrupts the law of gravitation every time he moves hand or foot, utterly rejects the statement that God did on one occasion cause an iron ax to swim upon the surface of a river.

Huxley could lift an ax above his head, but when he is told that Almighty God sustained an ax upon the surface of water, he says "impossible." In his New York addresses, he tells us that "the conception of the constancy of the order of Nature has become the dominant idea of modern thought." He begins the word nature with a capital "N." He remarks further, "To any person who is familiar with the facts, and competent to estimate their significance, it has ceased to be conceivable that events should depend upon any but the natural sequence of cause and effect." "The present is the child of the past and the parent of the future." "We ignore even as a possibility the notion of any interference with the order of Nature."

In a similar way Prof. Tyndall has come to regard Elijah on his knees praying for drought and rain, as only a "noble savage" ignorant of the principle of conservation of forces which he thinks destroys the possibility of a miracle. He has written to defend the sense-bound English clergymen who refused to take part in services of fasting and prayer on account of the calamity of a bad harvest. He concludes if free prayer can "produce changes in external Nature (capital N), it necessarily follows that natural laws are more or less at the mercy of man's volition, and no conclusion founded on the assumed permanence of those laws would be worthy of confidence. These are the insuperable difficulties presented to us. (1.) The principle of correlation of forces shuts out the possibility of supernatural interference. (2.) If God should work a miracle, the whole industrial and scientific world would forthwith be confused, and no scientific conclusion would be worthy of confidence.

Where now shall we seek for a brain sufficiently strong to refute these tremendous arguments? Who can liberate the Almighty from these adamantine chains of impossibility?

The logic of the difficulty resembles the famous proof that the minute hand of the clock can never overtake the hour-hand. At one oclock the minute-hand points to twelve, and the hour-hand to one. When the minute-hand reaches one, the hour-hand has advanced one-twelfth as much farther. When the minute-hand has traversed that one-twelfth the hour-hand has again advanced one-twelfth as much farther. and so on forever. Therefore the minute-hand can never overtake the hour-hand.

I suppose it does not seem incredible that Omniscience should somehow be able to break from these toils of logical impossibility, which the students of physical science have woven.

Even though all the scientists should unitedly proclaim that God is subject to the laws of matter, a shackled prisoner, still we should remember that the Lion of the tribe of Judah opened the book with seven seals, and we should expect the Almighty to break the scientific ropes and chains, which these audacious philosophers are trying to put about him.

The Christian man is not frightened when he is told that God could never have taken Enoch alive to heaven, because, before he had risen to the height of seven miles, he would have been "frozen perfectly stiff." In spite of modern infidelity, cultivated Christian thinkers will still believe that Elijah could have reached heaven without a chariot of fire to help him through the cold.

Can the All-Powerful and All-Knowing God be stopped by a smart conundrum and chained by a logical fallacy?

THE GREAT CENTRAL MIRACLE

Of the universe is the Lord Jesus Christ himself. He is miraculous in his origin, miraculous in his birth, miraculous in his sinlessness and moral beauty, miraculous in his resurrection from the dead (the best attested of all historic facts), and miraculous in his ascension into heaven.

Either Christ was a miracle in these ways and a miracle worker, or he was an impostor.

It is not credible that any advance of physical science will lead the world to reject Jesus Christ as a fraud and impostor.

By the nature of the case, miracles, which are only needed as signs to confirm the mission of a moral teacher, cannot be very frequent. They can come only in those moral exigencies that require them, but then they *must* come. Then it would be unnatural not to find the supernatural.

THE TEMPORARY EFFECT

Of modern scientific infidelity, it need not be denied, is more or less, to weaken faith in the supernatural. The confident and thousand times repeated assertions of lecturers and editors, that modern science has undermined the Bible and the church, have produced a natural effect. The mind is so constituted as to be influenced by the din of repetition. The persistent cry has, no doubt in numerous instances, weakened faith, and consequently damaged morality.

Unbelievers have been strengthened in their convictions, and even some of God's own people have taken a temporary refuge in scientific doubts while they

have neglected duty and yielded to temptations, to unchastity, Sabbath-breaking, over-reaching in business, untruthfulness and the like.

THE REASONS WHY

Unbelieving scientists have been able to damage faith, are easy to find.

1. They have beforehand, *the natural heart predisposed to reject Christianity*—"the evil heart of unbelief," "the carnal mind which is enmity against God."

2. *The unpleasant stringency of God's laws stimulates unbelief.* When the Bible forbids a man to do what he very much wants to do, he is prepared to accept bold assertions that the Bible is a discredited book.

3. *The greatness and vagueness of the field of view,* help to damage faith. Very few, indeed, have time to examine for themselves long enough to form independent conclusions. The confident objector comes forward on the platform, or on the page of the review, and says "We have been investigating a region where you are utterly unable to follow us, and we have found that belief in a God is a foolish superstition. We have utterly demolished the credit of the scriptures and exploded the belief in miracles." Such bold assertions have more or less effect, and the din of incessant repetition has more effect still. Rabshakeh stands to-day outside the walls of Jerusalem, and blows his horn in the name of the Sennacherib of modern science, and calls aloud for surrender.

"Where are the gods of Hamath and Arpad? Where are the cave-dwellers and the anthropoid apes, and the orohippus and the mesohippus? Where are the Ornithocelidans and the Compsognathus Longipes? Toss your Bibles over the walls and turn your churches into theatres; for we are coming to baptize you in the slimy Bathybius, and the Lord is powerless to deliver you out of our hands." This Rabshakeh-talk has some effect for evil upon the unlearned.

4. *The foolishness of the saints* also is the cause of some of the mischief which we deplore. The actual and indisputable advances in scientific knowledge have often met among God's people, with stupid denial.

Exploded theories of the interpretation of parts of the Bible have been clung to as though the theories were the Bible itself. This stupidity has brought contempt on religion.

Some scientific conclusions should be accepted and joyfully welcomed, because they are settled and sure. Other conclusions ought neither to be accepted or rejected. Toward them we should take a "waiting attitude" until they come into a clearer light.

For example, it is stupid now to deny that there may have been in the origin of man, a sort of creative or theistic evolution. Whether true or not, the current of probability is running so strongly in that direction, that a stern and unvarying rejection of every form of that theory is bigoted and hurtful.

It is not wisdom to insist that every good Christian shall believe that the omniscient and wonderful Creator formed the body of Adam, as a child would

make a mud pie. There are thoughtful and reverent Christians—it need not be denied—who regard the theory of an abrupt creation of the human body as insufferably crude, and quite out of harmony with the usual methods of the Creator.

Evolutionism in some form may or may not be true. On that point I do not, in this paper, define my belief; but I do say that in these days it is hurtful and stupid to deny and oppose every theory of evolution. Many sincerely think a creative evolutionism must be admitted as the theory of Copernicus was admitted. To denounce such honest opinion is uncandid, bigoted and mischievous. It loses to faith many noble souls. But while just now the efforts of unbelieving scientists may in some respects be damaging to the church,

THE EVIL IS TRANSIENT.

It will soon pass away, for reasons like the following:

1. The scientific infidels *are by no means as learned and competent to overturn Christianity as they think they are.* A young mouse, born and bred in a wooden chest, one day climbed to the top, and looking out into the dim and dusty attic, remarked that never before had he supposed the universe to be so large as it then appeared to him. God's universe is larger than some scientists have perceived. It contains more facts than matter and motion. It is too soon, by at least a thousand years, for any scientific Samson to come out with the jaw-bone of a Megalosaurus to level all the churches to the side-walk.

2. The scientific faith-destroyers are *at war among themselves.* They are united only by hatred to the church of Christ and unbelief in the possibility of miracles. Otherwise they float on a foaming sea of speculation theory and extravagant disagreement. Moreover they are varying and changing from day to day.

3. Another reason why the evil effect of scientific unbelief will be transient is the fact that scientific infidels *ask men to believe incredible things.* Reasonable people cannot yet believe in the spontaneous generation of life, or that God is a slave to his own laws. It is too much, to ask us to admit that the brain secretes soul as the liver secretes bile; or that a beefsteak can be literally and exactly transmuted into a prayer.

Parents are asked to believe that their dead children are nothing but manure in the universe, and they turn in horror and pain to the dusty old Bible to see what it may teach. The faith-destroyers say, "throw away the Bible, because it is so hard to swallow the camel of supernaturalism," and then they ask you to swallow, not one camel, but a whole menagerie of camels, elephants, gorillas, saurians, rhinoceroses and whales. It is too much to ask. They will not go down.

4. *Bad fruit grows on the tree of scientific infidelity.* The people are getting impressions of the real value and effect of the new gospel, from what goes by the name of nihilism and communism.

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The doctrines of the new gospel—conscience a changing product of evolution—no judgment after death and no judge to sit on a throne of judgment—no heaven—no immortality of personal existence—are found to be tending rapidly toward the destruction of morality and the extinguishment of civilization.

At first these results do not so clearly appear because the horrible doctrines do not immediately displace the settled Christian faith; but soon the tree will bear a heavy crop of communists, nihilists, assassins and leprous, lustful robbers, and the people will turn in horror to the sublime old Bible-morality, whose fruit is always wholesome and good.

5. Still further, the popular mind cannot *reject the testimony of Christians to supernatural experiences* in their lives. That Luther, Bunyan, Edwards, Whitefield, Wesley, Spurgeon, Moody and millions upon millions more, all agreeing perfectly in their soul-cheering testimony, are unworthy of belief will not be credited by sane and sober minds. The theory of probabilities makes it absurd.

IN CONCLUSION,

Therefore, we boldly predict that the end of this form of infidelity is at hand. Its decline has long since begun. While science advances, scientific infidelity will perish; and the form of the Almighty Creator, behind the material creation, will appear with ever increasing definiteness, grandeur and glory. Science and revelation (nature and the supernatural) belong together. The truths of science will surround supernaturalism as the cloud on Olivet surrounded the risen and glorified body of the Redeemer, and went heavenward with him. Science is the luminous cloud; the risen body of Christ is the miracle. Both together, they rise toward heaven and carry mankind with them.

ASTRONOMY.

COMETS.

BY W. W. ALEXANDER, KANSAS CITY.

They derive their name from a Latin word meaning hair, and are a singular class of celestial bodies (probably belonging to the solar system) from which long trains of light, called "tails," extend out, similar in appearance to hair streaming in the wind. When they are seen with the naked eye they consist of three parts *nucleus*, *coma* and *tail*; the different parts are not entirely distinct but blend into each other by insensible degrees.

The nucleus always appears the same, no matter what its position is relative to the earth and and sun *i. e.*, it presents no phases similar to the moon or planets. This proves the nucleus to be self-luminous, or of some transparent substance

through which the light of the sun can penetrate, and be seen on the side opposite to that which it first strikes. The coma and tail must be a very rare or thin substance, as the light from a sixth magnitude star is sufficient to penetrate and pass through it, where it is more than a million miles in extent; the star's position being the same as before, proving the density to be insufficient even to refract light.

Comets have, at different times passed very near the planets but have never been found to cause any perturbations or irregularities in their orbits, while their own were materially affected. Like the planets they move round the sun in conic sections, their orbits are in the form of an ellipse, parabola, or hyperbola. If an ellipse, the eccentricity is usually very great; those that move in this form of orbit return after a series of years; but those that move in parabolas, or hyperbolas, never return, but after wheeling about the sun once, will continue to recede into infinite space for ever, and may visit other systems and suns. When near the sun they move with great velocity, sometimes at the rate of twenty-four million miles a day. It is the observed velocity relative to its distance from the sun that enables astronomers to determine the form of the orbit; if at the distance of the earth its velocity is equal to 2,400,000 miles a day, it will move in a parabola, if it exeeds that velocity in a hyperbola, if less, in an ellipse.

In many cases the velocity is so near the rate stated that it is impossible to decide whether they will return or not, it is however, certain that their return will be delayed many centuries, and, perhaps, thousands of years.

The exact number of comets cannot be determined; over seven hundred have been observed and recorded. Many have doubtless visited our sun without being seen, reaching their perihelion in the day-time, or during cloudy weather. Arago calculates the number that have appeared, and will appear within the orbit of Uranus at 7,000,000; the same calculation extended to the orbit of Neptune would increase the number four-fold. In the opinion of Kepler, the celestial spaces are as full of them as the sea is of fish, only a small portion of them being within the range of telescopic vision.

Among the remarkable ones that have appeared may be mentioned Halley's, which was first observed on August 19, 1682, and remained visible about one month and disappeared. After Halley computed the elements of its orbit, he found by comparison that it must be the same one observed by Kepler in 1607, and that it moved in a very elliptic orbit, returning to the sun once in about seventy-six years. This comet again appeared and passed its perihelion March 12, 1759; by adding seventy-six years we find it should appear in 1835, and so it did, being first observed on August 5th; it approached the sun and passed its perihelion on November 16th at 11 o'clock a. m., only three days after the time predicted by De Pontecoulant, a French mathematician. It was followed until May 17, 1836, when it disappeared from view aided by the most powerful telescopes; but an astronomer can follow its course with the eye of science, which is almost as certain as ocular demonstration.

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Biela's is another remarkable one of this class of celestial objects. Being observed several times it was found to have a periodic time of six years and eight months. In the latter part of the year 1845 it was expected, and appeared, as usual, nothing remarkable being noticed, but in January, 1846, the astronomers of the Washington Observatory found it had separated into two distinct parts. At first one part was faint, but in about a month its brightness had increased so as to equal that of its companion. They disappeared in April, the amount of separation being about 200,000 miles. It was next due in 1852, and was looked for with great interest; when found, it was still divided only to a greater extent than in 1846, the space having increased to 1,500,000 miles.

This twin comet passed out of view on the 29th of September, 1852, and has not since been seen, time enough having passed for them to make four revolutions. At the return, due in 1872, the earth was in a very favorable position to see them, but they appeared not. They had seemingly vanished. As the earth passed through the orbit it encountered a small shower of *meteors;* which were probably a part of the lost comets.

Another bright comet appeared in 1843; the most careful investigation of its motion indicates that it will return in 530 years. Donati's; this great comet first appeared in 1858; it attained its maximum brilliancy in October. Its tail then measured 40° in length 10° in breadth; observations showed its orbit to be elliptical, and that it will appear again about the year 3808.

Comets were formerly regarded with superstitious terror, as precursors of famine, war, and other misfortunes. In more modern times the fear of a collision made them dreadful objects. This fear has been dispelled by the discovery of their great rarity. A collision might be fatal to the comet, but could do no injury to a solid body like the earth.

On June 26, 1881, I observed a comet in the north west, its right ascension was 6 h. and declination 60° north; the tail measured 7° in length and 1° in width. The direction of its motion was north and west, nearly at a right angle to the ecliptic. It occupied the position of a circumpolar star and was above the horizon all the time. When last observed, July 12th, its polar distance was 8°; the tail I could not measure, owing to the moon being too near full. This is known as Comet "B" of 1881.

THE COMET OF 1881.

TRANSLATED BY CAPTAIN J. M. TROWBRIDGE.

When the last light of daylight has disappeared, and the starry heavens appear in all the splendor of a summer's night, all observation is attracted at this time toward the northwestern horizon where a beautiful comet, visible to the naked eye, shows itself with a truly remarkable lustre.

What is this Comet? It appeared unannounced the 29th of May. Mr. Cruls, Director of the Observatory of Rio de Janeiro, observed it for the first at

that date, then the next day and last on the 9th of June. This appearance was immediately signalized to Europe. Now it is visible since the night of the 23d and 24th day of June, above the horizon of our hemisphere. Its principle elements observed to the present, give it a semblance, so to speak, corresponding with the comet which appeared in 1807. The trajectory of the two stars appear to be the same. The comet we are admiring at the present, possesses a very brilliant nucleus, as brilliant as a star of first magnitude.

Its tail is magnificent, notwithstanding it has changed into several new forms lasting lustres. Its progress is rapid; it moves from the sun toward the north, and in a few days will disappear. Whence comes it?

This comet has had a visibility sufficiently prolonged to have permitted numerous and close observations; the elements gathered, astronomical as well as physical, will tell us the probable duration of its revolution.

It is known that of all the comets observed to the present, the number is very limited, of which the periodicity has been determined with precision. Astronomers count eight only. They are

Encki's, period	3 3-10 years.
Bronsen's	5 1-2 "
Winnecke, a little	6 1-2 "
Arrests	5 6-10 "
Biéla	6 6-10 "
Faye	7 1-2 "
Tuttle	14 "
Halley, most memorable of all	66 "

All these differences demonstrate that comets are not, as formerly believed, celestial vagabond bodies, for which the laws of control and calculation did not exist. They observe on the contrary, the same laws of gravitation which govern all the stars of our universe, as they gravitate around the sun, and are dependant on his attraction, with this difference, that in place of following circular curves they follow oval curves, especially eclipses, astonishingly heightened.—*Scientific Correspondence La Presse.*

PECULIARITIES OF THE COMET OF 1881.

BY PROF. ORMOND STONE, CINCINNATI, OHIO.

The great comet now visible has been observed here at every opportunity since its discovery was first made known. On the morning of Friday, June 24th, although the northern sky was quite cloudy near the horizon, the comet was seen long enough to obtain a determination of its position. The head was quite complicated in form, the nucleus itself was very bright and the envelope on the side next the sun was quite similar, in appearance, to that of Donati's comet, as it appeared during the earlier part of October, 1858, as figured by Prof. Bond,

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in the Harvard Observatory Annals. This reticulated form of the head did not reappear on any subsequent night. The changes in form have been very rapid and wonderfully interesting. On Saturday morning there were two comparatively bright jets of nebulosity extending out in the direction toward the sun, but, separating and sweeping apart, were apparently driven backward by a repulsive force in the opposite direction. On the same side as these jets three other envelopes whose edges were at about equal distances from one another could be seen, diminishing in brightness as they receded from the nucleus, while another fainter jet was visible, issuing into the darker portion behind the nucleus.

On Monday morning a faint and slender secondary tail was visible to the naked eye extending toward and beyond a point a little to the right of Polaris, the principal tail which was quite bright and broad curving, toward the left and extending to, perhaps, half that distance.

A very interesting phenomenon was observed on Tuesday morning. In the evening only one jet was visible in the telescope making quite an angle with the direction of the tail. During the morning, however, a second fainter jet appeared nearly in the opposite direction from this, and at the same time the principal jet grew broader and finally separated so that now there were three visible, of which the center one was the brightest.

The most remarkable phenomenon, however, occurred last night about ten o'clock. During the early evening the comet was hidden by the clouds, but at about ten o'clock it became visible and at first sight a great change was noticed in its appearance. The fan or jet toward the sun had its usual appearance, but directly opposite this was another jet much brighter and narrower. It appeared nearly as bright indeed as the nucleus itself. A closer examination showed that this was separated from the nucleus by a dark line. After a little this separation became greater and the jet seemed to slowly float away from the nucleus and at the same time to form a fainter nucleus of its own, thus giving the comet for a time, the appearance of being double. The detached portion, however, gradually grew fainter until when last seen, although plainly visible, it was no brighter than the fan-shaped appendage on the opposite side of the nucleus.

CINCINNATI OBSERVATORY, July 17, 1881.

ASTRONOMICAL NOTES FOR AUGUST, 1881.

BY W. W. ALEXANDER, KANSAS CITY, MO.

Mercury, on the 5th, reaches its greatest elongation west of the sun, 19° 6′; the position is favorable for observation, it being in the constellation Gemini, nearly in a straight line with Castor and Pollux, about 9° south of the latter. On the 7th it will enter Cancer and rise at 3h 40m A. M.; by the end of the month it will be in superior conjunction with the sun.

Venus will be as visible as the morning star during the entire month; on the 2d it will enter the northern part of Orion, passing from thence into Gemini on the 6th, where it will remain until the 29th, then enter Cancer. It will be very brilliant and may be seen in daylight; its position being about 3h west of the sun. On the 20th it will be close to the moon.

Mars will be in Taurus all the month. On the 17th it is 4° 42′ north of Aldebaran, the brightest star in the constellation. Its apparent motion is direct, the mean daily increase in right ascension being 2 min. 40.8 sec., and in north declination 7′ 12″. It is slowly approaching the earth and increasing in apparent size. On the 15th it will rise at 11 h. 33 m. P. M.

Jupiter, the giant planet of this system, will rise about 11 o'clock P. M., and attended by its four satellites will present some interesting phenomena to those possessed of a small telescope, or a good opera glass. The satellites of this planet are the most difficult members of the solar system, for the mathematician to calculate, *i. e.* to find how much the attraction of one will affect the position of the others. The effect may be understood from the following laws:

1st. *That the mean motion of the first satellite added to twice the mean motion of the third, is exactly equal to three times the mean motion of the second.*

2nd. *That if to the mean longitude of the first satellite we add twice the mean longitude of the third, and subtract three times the mean longitude of the second, the difference is always 180°.*

The following is a list of their eclipses and prominent phenomena visible at Kansas City during the month: On the 4th at 00 h. 05 m. 04 s. A. M., *Io*, the one nearest to Jupiter, will disappear in eclipse. The same occurs again on the 11th at 1 h. 58 m. 48 s. A. M.

Europa, the next in order of distance from Jupiter, will reappear after an eclipse on the 15th at 00 h. 57 m. 44 s. A. M., and remain visible fifteen minutes and disappear in occultation behind the disk of the planet. On the 22d at 3 h. 33 m. 55 s. A. M., it likewise reappears, remains visible fourteen minutes and disappears. On the 29th at 3 h. 37 m. 51 s. A. M., it disappears in eclipse and does not reappear before daylight.

Ganymede, the third in distance from the planet, on the 14th at 1 h. 44 m. A. M., will appear after occultation and on the 21st at 00 h. 11 m. 29 s. A. M., it will reappear after an eclipse; it also disappears in eclipse on the 28th at 2 h. 37 m. 08 s. A. M.

The orbit of *Callisto*, the fourth satellite, is so much inclined to the ecliptic that it does not get eclipsed or occultated this month.

Saturn, on the 1st will rise at 11 h. 17 m. P. M., and on the 31st at 9 h. 21 m. P. M. On the 24th its position among the stars will remain fixed for a short time, owing to the earth moving in a straight line toward it. The apparent elements of its rings are as follows: Diameter of outer major axis 42.67″, minor axis 14.72″, inclination of the northern semi-minor axis to the circle of declination from north to east 34.3′, the elevation of the earth above the plane of the southern surface of the ring 20° 10.6′, elevation of the sun 18° 29.9′, earth's

longitude from Saturn counted on the plane of ring from the ring's ascending node on the equator, 94° 32.9′, on the ecliptic 51° 48.3′. Apparent diameter of the planet 17.5″.

Uranus on the 15th is within 1 h. 20 m. of the sun. consequently ti cannot be seen to advantage this month.

Neptune is in right ascension 2 h. 58 m. and north declination 15° 5′; being in the constellation Aries it will rise about 11 h. P. M. This is the most remote planet yet discovered in this solar system; it is invisible to the naked eye; seen with a telescope it looks like an eighth magnitude star, unless magnified more than 300 times. Under that power in a good atmosphere it presents a round disk 2.6″ in diameter.

The discovery of this planet is one of the grandest triumphs of mathematical astronomy; comparing observation on Uranus while it was still thought to be the most remote member of the system, astronomers found perturbations or irregularities, that could not be accounted for on the theory of gravitation. Taking the attraction of Saturn and Jupiter into account it was found that no table could be prepared that would agree with the observed position of this planet for any length of time. In 1845 Le Verrier being informed of the matter, went to work to see if the irregularities in the movements of Uranus could not be accounted for by the existence of a planet more distant; he found this to true; and even went so far as to compute its size and to predict in what part of the heavens it would be found at a given date. A letter containing the results of his calculations reached Berlin, September 13, 1846, and that very evening Dr. Galle found the planet within one degree of the calculated place. Mr. Adams, an English astronomer and mathematician had at the same time made independent calculations which were as accurate as those of Le Verrier.

CONSTELLATIONS VISIBLE ON THE 15TH AT 8 H. 40 M.

Commencing on the meridian at the northern horizon, we have Auriga; passing up the meridian towards the zenith we cross Camelopardis, Ursa Minor and Draco; beginning at the southern horizon in the same manner we cross Sagittarius and Hercules.

On the prime vertical east are Pegasus and Cygnus, in the west Virgo and Bootes. In the northeast lie Andromeda, Cassiopea and Cepheus, northwest Leo Minor and Ursa Major; southwest Libra and Serpens; southeast Capricornus, Aquila and Lyra.

On July 21st at 3:30 A. M., I observed a small telescopic comet in Auriga. Its right ascension was 5 h. 54 m., declination 40° 16′ north. On the 23d, 4 h. A. M., its right ascension was 6 h. 02 m., declination 42° north. Its brightness had increased to 1.3, and was visible to the naked eye.

This is probably the great comet which appeared in the year 1337. It will pass its perihelion on August 18th and attain its maximum brilliancy on the 20th. At that time it will form a very conspicuous and interesting object, rising in the northeast about three hours before the sun. It will be visible to the naked eye until September 5, 1881.

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GEOLOGY.

THE FOSSIL FLORA OF THE CRETACEOUS DAKOTA GROUP OF KANSAS.

BY CHAS. H. STERNBERG.

During March and April of the present year, I was employed by Professor Agassiz in the Dakota Group of Kansas, having charge of an exploring party. I have been very successful, collecting 800 specimens, representing nearly all the species of the Dakota Group and a great many new species.

Professor Lesquereux, the noted palæobotanist, has examined the collection, and described the new species. To Prof. Agassiz he says, "Your (my) collection was very valuable, not only by the number of new species, but also by the beauty and fine preservation of the specimens, from which the specific characters as to the variation of types might be studied with great advantage to science." To me he writes, "I have been delighted to see some very fine, new species; especially four new species of *Liriodendron*, (tulip tree,) one from Elkhorn Creek, *L. Cruciformæ*; three from Glasgow, *L. Acuminatum*, *L. Semi-Alatum*, and *L. Pennatipdum*, and there is an entirely well preserved *Liriodendron Giganteum*, which is known from one lobe only figured in the Cretaceous flora."

The *Liriodendon* was known in the Dakota Group by several species, but very few specimens. *L. Cruciformæ* is an anchor-shaped leaf, with an upper pair of lobes cut square at apex, the two basilar lobes are separated from the upper ones by a narrow sinus, and are long, with accute points that are recurved and nearly touch the upper lobes. Another species has all four lobes with acute apeices. Still another have the lobe cut down nearly to midrib, with no intervening sinus or one only a few lines in length. Of the three species of the tulip tree, *L. Meekii*, *L. Intermedium* and *L. Giganteum*, only the last is found in Kansas, and only one lobe was known to science, heretofore. So we have added a genus and a number of species to the Kansas Dakota Flora. We have also discovered fine specimens belonging to the genera *Menospermites*, and magnolia of the order *Polycarpiciæ*. The tulip tree belongs to this order. *Menospermites* is especially well represented by numerous species and well preserved specimens, especially *M. Obtusiloba*, and *M. Cyclophylla*. Of the *Cycadæ*, we have a new species of *Podozamites:* in the order *Filices*, we have *Gleichenia* and *Todea*. *T. Saporteana*, is represented by a number of fine specimens. The order *Zamiæ* has one species of *Pterophyllum*. The *Coniferæ*, have fine specimens of *Sequoia* (Red Wood). *Glyptostrobus*, (Bald Cypress).

All the known genera of the Dakota Group of the order *Cteoideæ*, are represented by fine specimens, *Liquidani Ara* (or Aralia) *integrefolia*, *Populites lirigeosa*,

P. Elegans, and *Salix proteæfolia*. Then we have a new species in the order *Amentaceæ*, *Myrica Sternbergii*. Also *Betula*, and a new species of *Aluites*, a new one of *Quercus*, and *Platanus Primæva*; of the order *Urticæ*, three new species of *Ficus*, represented by fine large specimens.

The order *Laurineæ* is well represented by the genera *Laurophyllum*, *Sassafras*, etc., and the order *Umbelliflora* has magnificent specimens of *Aralia*, *Saporteana*, *A. quinquepartita*, *A. Tonneri*, *A. Tripartita*, (or *imperfecta*) and *A. Concreta*. Also specimens of *Hedra*, and *Cissites*. *C. tennineriæ* is new in science.

The splendid genus *Protophyllum* (catalpa) of the order *Columniferæ*, is represented by leaves of *P. Sternbergii*, *P. Quadratum*, *P. Minus*, etc. The order *Aceraceæ* has a new variety of *Greviopses Haydeni*, and a new species *G. betulæfolia*. The order *Frangulaceæ* has a new species of *Rhamnus*. We have, also, beautiful specimens of *Phragmites*, a leaf with parallel veins. In addition we have a variety of *Tornacia saporteana*, which is, perhaps, new." Then we have a new species, *Anona Cretacea*. A new *Thusites*, two new species of *Sapindies*. We have also large numbers of perfect leaves of *Aspidiophyllum trilobum*, some are a foot in diameter, with thick perfoliated midribs. The *Araliopsis*, is especially well represented by fine leaves of *Sassafras Mirabile* and *S. Mudgii*. I have not yet seen Prof. Lesquereux's list of species collected by my party. But I think we have over fifty species, all of them from eighteen localities that are scattered over the Dakota of Kansas from Ellsworth to Ottawa county. Some localities are 100 miles apart, and each is noted for its own peculiar species. In Ellsworth county the localities are only a few miles apart.

On Spring-Creek we find the *Protophyllum*, (Catalpa). The *Sassafras* is very abundant on Thompson Creek. Bluff Creek has beautiful specimens of *Liquidambra integrifolia*. Three miles southwest of Fort Harker are found the splendid leaves of *Aspidiophyllum trilobum*, with some fine *Menospermites obtusiloba* and *Aralia rowueri*. Skunk Creek, south of Fort Harker, furnishes *Aralia quinquepartita*, *A. tripartita*, *A. saporteana*, and *Laurophyllum reticulatum*. The Elkhorn locality contains *Liriodendron*, *Phragmites* and *Salix*. At Churchill P. O., twenty miles above Salina, on the Saline River, *Sassafras Mudgii*. Sixteen miles northwest of Salina, on Saline River, we find *Sassafras Mudgii* and *Menospermites obtusiloba*.

Near Glasgow, we find *Liriodendron*, *Todea*, *Platanus*, *Populites*, *Rhamnus*, etc. Near Minneapolis are found *Aspidiophyllm*, *trilobum* and *Populites Elegans*. Muberry Creek, near Clay Centre, furnishes *Platanus Heeri*. My explorations have confirmed the opinion of Professor Lesquereux, "that the forests of Cretaceous Dakota Group, grew on isolated islands in a wide expanse of waters."

METEOROLOGY.

THE WEATHER MAP AND THE OFFICIAL WEATHER INDICATIONS.

BY ISAAC P. NOYES.

Occasionally we hear the remark—"the Signal Office was way off in their weather predictions yesterday"—"They have not been doing well for the past two or three days." The weather, like many other things is irregular. At times it is almost like clock-work, and may be very well defined for even three or four days in advance; then comes a change. The relations of "High" and "Low" are such that it is more difficult to tell what the weather will be twenty-four hours in advance than at other times to tell what it will be for three or four days in advance. The elements which go to make up our weather system do not operate in regular grooves, but on the contrary are ever on the alert for the best opportunity. Heat and cold vie with each other for the mastership, and "low" is ever seeking the most favorable localities to advance to, and is all the while being thwarted in its course and check mated by "high." In this department of nature as in all other departments, even in affairs of men, as in politics, the great end is after all, more or less influenced by compromise. Nature in this respect, often sets us a wise example. Not that all our actions should be governed by compromise, yet a judicious compromise is often times the part of wisdom.

May 27th to 31st, inclusive, well illustrates the point in question and reveals some of the difficulties that the Weather Bureau labors under. When a statement is made by this office and the same is not fulfilled the weather-map of the succeeding day will reveal the cause and a cause that any fair minded and intelligent person will readily comprehend and make allowance for. The weather map reveals everything and conceals nothing. May 27th the new "low" was in the northwest, "high" in the east, both moving toward the orient. The appearance then was that on account of the situation of "high," "low" would be deflected to the north and that the weather for this locality for the next two or three days would be warm and pleasant but not hot. On the 28th the main lines of "high" had passed off and left the coast apparently clear for "low" to advance without interruption, and the indications were that the advanced lines of "low" would be here on the 29th, passing this locality from the 29th to the 30th. It looked bad for Decoration Day. But "high" after all was not so fast about getting *entirely* out of the way, as it lingered and the rear guard retarded the advance of "low." For the next twenty-four hours "low" made very little progress and what little advance was made was more to the southward than the eastward; yet we were all the while on the look out for it and expecting it every hour.

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On the 30th the situation of "high" and "low" was not relatively changed. Both had worked a little more to the southward. "Low" was still held at bay, but ready to advance toward Washington at short notice.

At 7 A. M. on the morning of the 31st the old "high" had disappeared off the coast. A new "high" was faintly indicated in the northwest. "Low" by this time had been crowded away down into Texas, Indian Territory, Arkansas and Louisiana, liable at any moment from this new position to advance and create what is generally termed a northeast storm. On the afternoon of the 31st this old "low," which had been so long expected finally reached here.

June 1st a supplement to this "low" which had been separated from the main body came marching on. June 2d the coast was comparatively clear again, only a little new "low" in the northwest, which it was not expected would disturb the conditions of this locality; but before midnight its course was such that the indications for the morning of the 3rd of June, were quite different from that of the afternoon of the 2d.

It may be asked if there is no way of ascertaining in advance the course these storm centers will take or the speed at which they will travel across the country. None that we have thus far been able to discover. March 25th and 26th "low" went from the base of the Rocky Mountains to the Atlantic coast in thirty-two hours; on this occasion we see that it took five days for about the same distance.

The indications of the Weather Bureau prove this uncertainty of direction and speed, for they would be most unwise not to do the best they could. The weather map of each succeeding day is a proof of their wisdom and integrity. Let the weather map be well understood, and what are now termed "mistakes" will be revealed to be the best information that human wisdom could devise.

In years to come when the world has comprehended the usefulness of the weather map, and comes to understand the movements of "high" and "low," and becomes weather prophets for themselves, it will be amusing to contrast the writings of to-day, which plead for and defend the wisdom daily revealed on these maps, with the childish comments upon the weather, and the absurd attempts at guessing what the weather will be months and weeks in advance. I have pleaded for intelligence—for the intelligent people of the world to learn something about weather—about it as it stands to-day and as revealed on these wonderful maps; but hardly a day passes but what the most absurd notions in regard to the weather appears in prominent papers, and reveals the fact that many of the most intelligent people in the world are content to trust in sensational prophecies of the weather by those who have not contributed one advanced idea in regard to the changes which go to make up our weather system.

The recent appearance of the comet reveals this fact most forcibly. The peculiar cool weather of June is "all owing to the comet." So they attempt to tell us. Had it been very warm these same parties would have said that it was "all owing to the comet;" as people in different localities on the same evening credit the clear or cloudy sky to the moon. It would seem that intelligent people

should rise above such incongruities. Wisdom it would seem should inspire confidence, but instead ignorance seems to carry the day, at least in this department of the weather. If one will consult the weather map for the month of June they will see that "Low" most of the time passed over the country on a medium low line of latitude. The course of the majority of these "lows" or storm centres being from the northwest passing east on a line gradually working to the southward, even going as far south as Cape Hatteras and then along the coast to the northeast section of the country. Occasionally, however, one or two would keep on a high line. When they did so it was warm.

These "lows" were so peculiar, so variable that it was most difficult to predict the result. The sudden changes necessitated variable "indications." For example it often happened that the evening paper would prepare the public for the next day to expect a certain kind of weather, when the change in only twelve hours would be such as to cause an "Indication" for the day to be quite the reverse. Then as on the 27th, 28th and 29th of June the confines of the area of "low" hovered about the locality of Washington. The storm centre had really passed and "indications" were published in accortance therewith. But these is no knowing what to expect from what may be termed the "posterior low,"* especially when "low" is on a high line, when the tendency is to create intensity of heat, or as it were develope local sub-"lows." Where these "lows" will develope it is beyond the power of man to know. We know that they will develope somewhere within an area of three to five hundred miles—such things in nature being on a large scale—but where will the objective point or point of concentration be, that is a question that I am thinking will ever defy the perception of man to find out in advance of the local demonstrations as revealed to the locality by that peculiar effect of "closeness" in the atmosphere which precedes the storm.

As before stated in these papers, nothing better illustrates the course of "low" than to pour some water upon a slightly inclined plane and note the effect. Of course we know beforehand that it will take a certain general direction. But just note the course it takes how it circumvents spots, taking a zigzag course and coming together again, leaving certain spots dry, others wet, and never twice a alike. So with these "lows" and especially these "posterior lows" travel. To undertake to say just where local thunder storms or tornadoes will take place is most absurd. We know that they must take place somewhere within the general limits of "low" or the track of "low." But who will map out the lines beforehand? As well may we attempt during a thunder storm to tell the exact places where the lightning will strike. We know that lightning is very apt to strike somewhere during a thunderstorm, but to pretend to be able to locate the spot or to request another to so is most absurd. Always when a storm centre is passing or has passed, we are liable, according to the season of the year to have cer-

* In the future in these papers I will use the following terms to indicate the different phases of the storm centre. The "anterior low" to indicate that which precedes the centre propet; the "posterior low" to indicate that portion following the centre.

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tain effects which we term thunder storms, tornadoes, etc., but to locate them exactly or to say that they will positively occur seems most absurd to prophesy. Yet with all this intelligence and undeniable facts people even suggest and seem to believe that the sensational weather prophets must have some knowledge, some secrets of the weather patent to themselves which have not as yet been discovered even by the Weather Bureau, and many seem to have the idea that the Weather Bureau is well enough in its way for daily indications, but that the "weather prophet" system is better for forecasting the weather weeks and months in advance. They would, as it were, make a compromise between the two. Such remarks only prove ignorance of the subject on the part of those who make them.

In this connection it must be borne in mind that the daily "indications" is only a part of the work of the Weather Bureau. The main work, whether realized or not, is to gain a knowledge of the meteorology of the world, and only through such efforts have we gained our present knowledge, in comparison with which all the knowledge of the "great weather prophets" of the world is as nothing and mere boy's play. Instead of the "prophet" system being superior to that of the Weather Bureau, it is in self impractical, unscientific and worthless, for the reason that there is no dependence in the idea that the weather periodically repeats itself. The changes are endless, and there are so many powers and counter-powers at work, for them all to work together to produce results twice alike is absurd and unwarranted the by facts by the best authority accumulated in this department of science.

The friends of one of the "weather prophets" claim that he can tell what the weather will be for a year in advance, even to the month and day. Let any intelligent person consult the almanac of this "prophet" for 1881 and note the prophecies for the first half of the year and compare them with what has actually taken place. For the month of June nothing could be more reversed. Seeing, however, that the month of May was prematurely warm he issues another statement quite the reverse of his first—evidently founding it upon the idea that premature heat at this time of the year will be followed by cool rather than warm weather. All of these attempts, however, were of no practical value or any nearer the mark than any person could do who knows about what kind of weather is most likely to occur during the different months of the year. According to this man we were to have a fearful storm throughout the west and east on the 20th of June, but the map for the day previous was clear as to the west, with only a probability of a local thunder storm or two in the east. But then it does not seem to matter how far from the mark this man comes; "great things" are claimed for him. Claims, it would seem, that the intelligent people of the world would have little respect for. The only reason that there is respect for such prophecies lies in the simple fact of want of knowledge of the weather system. Let this subject be understood as well as the other sciences of the world and we will have an entirely different order of things in this department. We will have

a more complete weather system. As for "weather prophets" they will all be at a discount.

The future will demand more stations, especially throughout the west. The result of this will be better daily reports, whereby better and more advanced weather indications may be given to the country. The more we advance in this direction the more satisfaction will we derive from the system as a whole. Let the intelligent world once see and fully realize this and they will do all in their power to advance the interests of a worthy Bureau which at present seems to receive little favor from them.

Attention paid to error is detrimental to truth and honesty, while attention and support to that which is true advances truth and honesty and helps to build up the whole moral character of the world. Advances the human race and establishes a broad foundation for it whereby it may the more successfully contend against that which is false.

WASHINGTON, D. C., July 4, 1881.

METEOROLOGICAL REPORT FROM JUNE 20, TO JULY 20, FROM OBSERVATIONS AT WASHBURN COLLEGE, TOPEKA, KAS.

BY PROF. J. T. LOVEWELL, DIRECTOR.

TEMPERATURE OF THE AIR.	June 20th to 30th.	July 1st to 10th.	July 10th to 20th.	Mean.
MIN. AND MAX. AVERAGES.				
Min.	61.4	69.9	72 6	68.
Max	84.5	89.4	94.1	89.3
Min. and Max	72.9	79.6	83 3	78.6
Range	23.1	19.8	21.5	21.5
TRI-DAILY OBSERVATIONS.				
7 a. m.	70.1	78.4	82.	76.8
2 p. m.	79.7	86.6	89.8	82.
9 p. m.	75.0	79.9	83.6	79.5
Mean	75.9	81.3	84.4	80.5
RELATIVE HUMIDITY.				
7. a m.	.87	.73	.74	.78
2 p. m.	.73	.65	.64	.67
9 p. m.	.81	.72	.69	.74
Mean	.81	.69	.69	.73
PRESSURE AS OBSERVED.				
7 a. m.	28.90	29.11	29.12	29.01
2 p. m.	28.93	29.05	28.96	28.98
9 p. m.	28.93	29.05	28.96	28.98
Mean	28.92	29.07	28.98	28.99
MILES PER HOUR OF WIND.				
7 a. m.	10.3	11.2	6.7	9.4
2 p. m.	13.1	16.2	10.3	13.2
9 p. m.	9.6	11.7	10.6	10.6
Total miles	2908	3003	2543	8454
CLOUDING BY TENTHS.				
7 a. m.	6.3	2.2	4.8	4.4
2 p. m.	3.9	3.7	6.4	4.7
9 p. m.	3.9	.1	2.1	2.0
RAIN.				
Inches	2.60	.00	.44	3.04

The weather of the first twenty days of June, which was very favorable to the growing of crops, continued through that month. Since then there has been very little precipitation and the temperature has been very high.

Extremes both of high and low barometer have occurred, but no severe storm been developed in this locality.

Highest temperature 98°, on the 18th. Lowest temperature 48°, on the 28th.

Highest barometer 29.36, on the 2d. Lowest barometer 28.70, on the 20th.

Miles traveled by the wind 8455.

Highest velocity of wind 48 miles per hour on the 21st.

The usual summary by decades is given above.

BOOK NOTICES.

BUTTERFLIES, THEIR STRUCTURE, CHANGES AND LIFE HISTORIES. By Samuel H. Scudder, octavo, pp. 322; New York; Henry Holt & Co., 1881. Price $3.00. For sale by M. H. Dickinson.

In this field of investigation there is no more skilled and enthusiastic explorer than Mr. Scudder. He has devoted years to this branch of science, and his works on entomology, fossil and present, are numerous and exhaustive, including "Fossil Myriapods of Nova Scotia," "Catalogue of Orthoptera," "Fossil Butterflies," etc.

The work under consideration treats of the egg, the caterpillar, the chrysalis, the butterfly, the internal organs of caterpillars, the transformations of the internal organs during growth, the habits of the butterfly, their seasonal changes, coloring, diversity of the sexes, origin and development of ornamentation, ancestry and classification, geographical distribution, instructions for collecting, rearing, preserving and studying, closing with a list of butterflies with scientific and popular names and list of their food plants. This covers the whole ground and gives the reader or the student a comprehensive view of the whole subject, written in an easy and attractive style and illustrated in the most artistic manner.

To say that it is the most complete and thorough treatise that has yet been published on this subject, is to come far within the truth, and to say that it is the most beautifully printed, illustrated and bound scientific work of the day, is to no more than do justice to the publishers, who are giving great attention to this class of books, so much needed at the present time.

FAMILIAR TALKS ON ENGLISH LITERATURE. By Abby Sage Richardson; 8vo. pp. 454; Chicago; Jansen, McClurg & Co., 1881. Price, $2.00.

This history of English literature is very naturally divided into six parts, viz: 1. English Literature Prior to Chaucer, 449 to 1300. 2. From Chaucer to Spen-

ser, 1400 to 1600. 3. From Spenser and Shakespeare to Milton, 1550 to 1608. 4. The Civil War and Restoration, Milton to Dryden, 1608 to 1700. 5. From Pope to Wadsworth, the 18th Century. 6. The Lake School and Its Contemporaries, 1790 to 1822. Each part is fully illustrated with copious selections from the best writers of that period, while a historical sketch of the times and of writers themselves keeps up the continuity and interest of the work and lends additional attractions to it. Mrs. Richardson is an experienced lecturer on topics of this kind and is as thoroughly familiar with the subject as any author of the present day. She is also a ready and pleasing writer, who is sure of readers at all times and in all portions of the country.

Her judgment in the selection of appropriate and characteristic passages from the various authors referred to is excellent, and the logic of her arrangement in demonstrating the progressive growth of the English language in power and mobility is unassailable. As a book to be placed in the hands of teachers and younger readers as a guide in tracing the history of our literature, we know of no superior.

The typography and other points in the bookmaker's art are excellent, and do credit even to such publishers as Jansen, McClurge & Co.

ZUNI AND THE ZUNIANS. By Tilly C. Stevenson, pp. 30, large octavo; 1881.

We are indebted to Professor O. T. Mason for a copy of this interesting and valuable monograph. The writer was a member of the expedition sent out by Major J. W. Powell in 1879, to visit the pueblos of New Mexico and Arizona, and consequently had unusually good opportunities for investigation and exploration. The greater portion of the work is devoted to a careful description of the Zuni pueblo, which is situated in western New Mexico, and is the remains of a large village and populous race which have been reduced by war and disease to the present size and number. The author concludes with the expression of earnest hope, which is fervently concurred in by all of as who have visited this most attractive field for the archæologist, that the "government will with enlightened liberality cause further research to be conducted in the interests of archæological and ethnographical service, and secure for itself, before it is too late, the data required to fully elucidate the history of the Pueblo Indians." The illustrations, which are numerous, are mostly borrowed from the Smithsonian Institution, and, consequently of the first quality.

REPORTS ON THE TOTAL SOLAR ECLIPSES of July 29, 1878, and January 11, 1880, issued by the United States Naval Observatory, 4 to pp. 426, Washington, D. C., 1880.

This magnificent work, the most perfect specimen of government bookmaking we have ever seen, comprises the instructions issued to observers. Observa-

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tions at Creston and Separation, Wyoming; Idaho Springs, Central City, Pike's Peak, Denver, Schuyler, La Junta, West Las Animas, Colorado; Dallas, Texas, and other places of less importance. Among western observers, we notice the names of such astronomers and engineers as Prof. Ormond Stone, of Cincinnati, Ohio, Capt. E. L. Berthoud, of Golden, Colorado, Profs. C. W. and H. S. Pritchett, Glasgow, Missouri, Prof. J. C. Watson, of Ann Arbor, Michigan, Prof. Jos. Ficklin, of the Missouri University, and D. H. Talbot, of Sioux City, Iowa. All of the more prominent astronomers of the east, including those in the service of the Government, make very full reports.

To this report is added one on the Total Solar Eclipse of January 11, 1880, at Santa Lucia, California, by Prof. Edgar Frisbie, U. S. N.

The illustrations in this volume are executed most artistically. The photographs could not be reproduced correctly, but the wood cuts and lithographs (by Mr. Julius Bien, of New York,) are superb.

THE GOSPEL HISTORY. By James R. Gilmore and Rev Lyman Abbott, D. D., 16 mo. pp. 830. Fords, Howard & Hulbert, N. Y., 1881. For sale by M. H Dickinson. Price, $1.75.

This is a complete chronological narrative, woven from the text of the four evangelists, with notes, original and selected, and indexes. The names of the two authors are a sufficient guarantee of exactness, scholarship and elegance of style, and it will be found fully equal to the expectations of the most sanguine student in all of these points. The amount of work done by the authors or, perhaps rather, editors, as shown by the lists of authorities consulted, must have been immense, while the copious notes and references, chronological indexes, etc., show how careful and thoroughly every part of the labor has been performed.

It is just such a work as every Sunday School teacher and advanced scholar needs for reference, while for family use it has no equal.

The mechanical part has been well done, and the publishers are entitled to full credit for it.

SHADOWS OF SHASTA. By Joaquin Miller; 12 mo. pp. 184. Jansen, McClurg & Co., Chicago, 1881. Price, $1.00

It is difficult to properly criticise a book which is neither history nor romance, although evidently written with both objects in view. Mr. Miller's style is of the intense order at all times, but in our judgment better adapted to poetry than passionate and vindictive prose. In the former we can overlook exaggerated and dramatic description, but in the latter we rely upon sober and stern facts to produce lasting impressions. In this book the author's vigorous assertions savor too much of the imagination to carry much weight with them, especally when framed as they are in poetical figures and improbable romance.

There is no doubt that the Indians have been sadly mistreated by dishonest contractors and avaricious agents, who were false to their trusts, but here in the West the Indian character has lost the halo of glory which surrounded it in the past and in the far off East, and the people are not likely to be aroused to any extreme sense of the great injustice and cruelty that have been practiced upon them by a book of this character. No one on the western borders of the United States believes that the "Government makes its army an instrument for oppressing and pillaging the weak, and the tool of thieves," as the New York *Tribune* says, in commenting favorably on this book.

We have a due regard for Mr. Miller as a poet, but we honestly believe that in this case he has given too loose a rein to his fancy for his credit, even as a reliable romancer.

Doubtless the work will meet with a large sale and will have a good effect in moulding a public sentiment which will compel the appointment of a better class of agents and a more rigid surveillance of them by the Government. For this purpose it may be that exaggeration and injustice can be condoned.

OTHER PUBLICATIONS RECEIVED.

The Alienist and Neurologist, quarterly, 160 pages, C. H. Hughes, M. D., St. Louis, $5.00 per annum; The Harvard University Bulletin, No. 19, by Justin Windsor, Librairian, June 1, 1881; Studies in Astronomy, a lecture elaborated for general readers, by Arthur K. Bartlett, Battle Creek, Michigan; On the Determination of the Error and Rate of a Clock, by the Method of the least Squares, by Prof. Ormond Stone, Cincinnati, Ohio; Report to the Governor and 39th catalogue of the Missouri University, 1880–81; On an occurence of Gold in Maine, and a Microscopical study of the Iron Ore, or Peridotite of Iron Mine Hill, Cumberland, R. I., by M. E. Wadsworth, May, 1881; The Tourist, by Rand, McNally & Co., Chicago, 1881; American College Directory, vol. 3, 1881, C. H. Evans & Co., St. Louis, Mo.; Twelfth Annual and Thirteenth Statistical Report of the Cincinnati Board of Trade and Transportation for the commercial year 1880, and the fiscal year ending March 1, 1881, by J. F. Blackburn, Secy.

SCIENTIFIC MISCELLANY.

NOTES AND QUERIES.

The following is the text of the act of the Legislature of Arkansas officially determining that the correct pronunciation of the name of the State is "Arkansaw:"

Be it therefore resolved, by both Houses of the General Assembly, That the only true pronunciation of the name of the State, in the opinion of this body, is that received by the French word, presenting the sound, and that it should be pronounced in three syllables, with the final "s" silent. The "a" in each syllable with the Italian sound, and the accent on the first and last syllables being the pronunciation formerly universally and now still most commonly used; and that the pronunciation with the accent on the second syllable with the sound of "a" in man and the sounding terminal of "s" is an innovation to be discouraged.

T. J. CHURCHILL,
Governor of Arkansas.

Approved March 15, 1881.

Hon. W. G. Ritch, in his inaugural address before the Historical Society of New Mexico, mentioned that the first merchandise received in the territory from east of the plains came from Kaskaskia, Illinois, in 1804. This is probably true, but Mr. Ritch does not mention the fact connected with this beginning of the overland trade. In the year mentioned William Morrison, a gentleman residing at Kaskaskia, who was largely engaged in the trade with the Indians on the Upper Missouri, fitted out a Canadian voyager named Baptiste Lalande, with a stock of goods and sent him to the Pawnees on a trading expedition. Lalande, after arriving among the Pawnees, found there some Spaniards from Santa Fe, and, learning from them that he could dispose of his stock there to a good advantage, pushed on to that place. Upon arriving there he sold the goods entrusted to him and, being pleased with the country concluded to remain there, at the same time appropriating Mr. Morrison's money to his own uses. In 1806 Lieut. Pike explored the sources of the Arkansas, and, encroaching on Spanish territory, was taken into Santa Fe. In his command was one Dr. John H. Robinson, to whom Mr. Morrison had entrusted his claims against Lalande, but by this time the latter had squandered the money and was unable to make restitution. The fact was developed, however, that there was money to be made in sending goods to Santa Fe, and the overland trade began. J.

Does science to-day sustain the conclusion of Gauss of Göttingen, that the centers of terrestrial magnetism are not the so-called "poles?"

Are these poles the places of greatest magnetic intensity?

If so, would not the presence of such physical force be unfavorable to any or all of the now known forms of life?

This being true, would not such conditions preclude the possibility of ever effecting the discovery of and direct approach to the so-called poles?

What is the scientific opinion of the theory that the discovery of another continent, as great in extent and resources as any now known, will attend the discovery of the "Northwest Passage?" ANON.

I have a copper gilt medal, two inches in diameter, dated 1512, with a lion and bear rampant over two shields, sword in hand, blazing sun above them, and the inscription "*Hoc duce pugnamus,*" on the obverse side. On the reverse is the date, as above, a quantity of flags, arms, drums, etc., with the inscription "*Un— Crescunt splendore leones et ursi.*"

Can any one explain it, and inform me what occasion it is intended to commemorate? C.

I have just finished reading J. P. Jones' article on the location of Fort Orleans. This interesting article has excited a great deal of interest in me and I think I can contribute something to this question.

I have a large map of the United States and Canada of date 1793–1880. A French reprint of Arrowsmith's Map by F. Tardieu, Paris.

He places the position of *Fort Orleans*, on the *north* side of the Missouri River, between Grand and Vaseuse River, just between the confluence of two small nameless creeks. *The village of the Missouris is plainly shown on the south side of the river.* No account I have ever read, or any map I have ever seen gives the Missouris any villages on the *north* side of the Missouri River. The map indicates no island upon it.

Hennepin's map, Leyden Edition, 1704, places Missouri villages on south side of Missouri River very near its entrance into the Mississippi.

I see that Major Long in his ascent of the Missouri River in 1820, does not mention Old Fort Orleans, but gives a good description of Fort Osage.

Fort Osage was located where now stands the town of Sibley.

According to my map Lewis and Clark are in error, as they make the site of Old Fort Orleans five miles below Grand River. In this map it is fifteen or twenty miles above.

Des Payes in his travels in Louisiana, 1768–69, does not mention Fort Orleans.

I have sent for some more old accounts of Louisiana and for some old maps of New France. When received I will look up this point more critically.

E. L. B.

REVIEW, Vol. 5, No. 1, "Antiquary—Reply. The Confederate Congress ordered a seal engraved in England with the following motto: "*Deo Vindice,*" and with a device representing an equestrian statute of Washington. This seal did not reach Richmond until just about the time of the surrender of Lee and no official impression was ever made with it.

Whether the generals served without commissions or not, I cannot say, but General Robert E. Lee testified before the Committee on the conduct of the war, that he could not remember that he had ever taken an oath of allegiance to the Southern Confederacy. J.

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Gallatin in his synopsis of the Indian tribes, published in the second volume of transactions of the American Antiquarian Society, in speaking of the southern branch of the Sioux Indians, says: "The five other tribes of the sub-division are the Ioways or *Pahoja*, the Missouri's or *Neojehe*," etc. Can any of the readers of the REVIEW inform me where the term *Neojehe* is obtained and what it means. J.

REVIEW, Vol. 5, No. 1, G. C. Broadhead—Reply. I know of but two treaties made by the Government with the Osage Indians for the cession of lands. The first, that of 1808, to which you refer, they ceded, 33,173,383 acres in Missouri, and 14,830,432 acres in Arkansas. This cession comprised all their lands in Missouri. The second treaty was in 1818. J.

EDITORIAL NOTES.

THE twenty-ninth annual meeting of the American Pharmaceutical Association will be held in this city, this month, commencing on the 23d and adjourning on the 27th inst. This is the first time the Association has held a meeting as far west as this point, and from present indications the meeting promises to be unusually attractive, as the western druggists are taking an active interest. The display of Chemicals will be grand, as the large hall (Board of Trade) which has been secured has been divided up into spaces to suit the demands of exhibitors, and every foot has been taken by prominent manufacturers, among them many who will make their display at our meetings. The railroads and the hotels will make liberal reductions for persons wishing to attend. The local committee, of which Wm. T. Ford is secretary, is arranging for excursions, etc., and will spare no pains to render the occasion pleasant and profitable.

WE call attention to the Institutions of learning advertised in our columns this month. They are, of their kind, the best schools in the west and we advise students to confer with the authorities before deciding to go further and perhaps fare worse.

PROF. CHAS. STERNBERG writes us from Ft. Riley, Kansas, that while on his recent exploring tour he discovered in Gove county the upper and lower jaws and premaxilla of a *Leiodon proriger* Cope. The lower mandible was three feet and nine inches long and perfectly preserved. Up to the time of writing (July 7th) he had collected 119 fossil fishes, 22 saurians and 2 pterodactyls.

WE are gratified to learn that Prof. H. S. Pritchett has been elected Professor of Astronomy in Washington University at St. Louis, in place of Prof. Rees, who goes to Columbia College, New York. Both are able men, and we congratulate the respective institutions in having secured them.

CINCINNATI has followed the example of Kansas City and St. Louis by adopting the electric time ball, which went into operation on the 18th *ultimo*.

PROF. C. S. SHEFFIELD, so well known here, has been re-elected President of the Pierce City Baptist College, and placed in charge of the financial as well as its educational management.

PROF. ORMOND STONE, of Cincinnati, who has been studying the newly discovered comet, says it is his opinion that it is the comet of 1337, that it may become visible to the naked eye, and will reach perihelion about August 9th.

NEARLY all the railroads leading towards Cincinnati have reduced their rates to members of the American Association for the Advancement of Science which meets there on the 17th inst. Those attending will doubtless enjoy the occasion very highly, as the people of Cincinnati are noted for their scientific culture and their hospitality.

MR. W. W. ALEXANDER informs us that at 8:25 on the night of July 25th, a large and brilliant meteor appeared and passed across the sky from the southeast to the northwest. As near as he could estimate it was three times as bright as the planet Venus. It had a luminous train, or tail, about 2° in length. Its apparent motion was very rapid, traveling over 120° in ten seconds.

THE article on Arctic Exploration in this number was written by a thoroughly competent person and will be a valuable one to preserve, since it gives a full account of all the expeditions now out under the auspices of the United States, and by referring to it at any time when news from any of them suggest it, the reader can comprehend the situation without trouble.

WE are promised an occasional article from the pen of Dr. A. B. Stout, of San Francisco, author of the article on The Aleutians in the present number of the REVIEW. As the Doctor has given a great deal of attention to such matters, and the Pacific coast is a prolific field for the ethnologist and archæologist, we feel much gratified to be able to make this announcement.

ITEMS FROM THE PERIODICALS.

THE contents of the *Popular Science Monthly*, for August, are as follows: The Herring, by Prof. T. H. Huxley, F. R. S.; Physical Education, by Felix L. Oswald, M. D., Recreation; The Blood and Its Circulation, by Herman L. Fairchild, (Illustrated); The Teachings of Modern Spectroscopy, by Dr. Arthur Schuster, F. R. S. (Illustrated); Origin and History of Life Insurance, by Theodore Wehle; The Insufficient Use of Milk, by Dyce Duckworth, M. D.; Intelligence of Ants, by George J. Romanes; Lunar Lore and Portraiture, by F. E. Fryatt; The Visions of Sane Persons, by Francis Galton, F. R. S.; Schoolroom-Ventilation, by Dr. P. J. Higgins; Origin and Uses of Asphalt, by Leon Malo, C. E. (Illustrated); The Unit in Plant-Life, by Byron D. Halstead, Sc D.; The Electric Storage of Energy; Sketch of Robert Wilhelm Bunsen, (with Portrait); Correspondence; Editor's Table; Literary Notices; Popular Miscellany, and Notes.

THE Princeton *Review*, for July, contains the following articles: Continental and Island Life, by John W. Dawson; English Poetry in the Eighteenth Century, by John C. Sharp; The Historical proofs of Christianity, by George P. Fisher; Philosophical Results of a Denial of Miracles, by John Bascom; Late American Statesmen, by Francis Wharton; Anthropomorphism, by M. Stuart Phelps. The Princeton *Review*, under the new management furnishes its readers with papers from the best thinkers and writers on both side of the Atlantic. The present number is fully up to the standard. One generally reads such publications by an eclecticism, dipping in here and there to taste the quality, but the present number will be read through from beginning to end with unabated interest.

REV. H. C. BROWN commences with this month the publication of a new family monthly called the *American Home Magazine*. An examination shows that it is well arranged, well edited and well printed. Mr. Brown's reputation as a scholar and a minister is a sufficient guaranty that it will be kept upon a high literary and moral plane, and we predict for it abundant success.

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LIEUTENANT SCHWATKA continues in *Good Company*, for June, his interesting articles entitled "In the Land of the Midnight Sun," and to the same number Mrs. General Wallace contributes one on "The Land of the Pueblos," while S. J. Douglas gives us "An Ornithologist in Arctic Russia."

THE *Atlantic*, for September, will give the second installment of Mr. Howell's delightful novel, Dr. Breen's Practice, which promises to be the author's most successful work. Among the miscellaneous papers will be an interesting essay on The Housekeeping of the Future, a charming sketch of A Florentine Family in the Fifteenth Century, an article on The Future of Harvard Divinity School, and a study of Fairy-lore by Mr. John Fiske. The number will also contain the concluding part of Mrs. Foote's story, In Exile, and the continuation of Mr. James' Portrait of a Lady, with the usual Literary Reviews, Contributor's Club, and Books of the Month.

THE *Humboldt Library* closes its first volume (755 quarto pages) with Popular Scientific Lectures by Prof. H. Helmholtz, and its publishers will furnish the whole set, bound, for $4.co.

PROF. HENRY A. WARD, of the Natural Science Establishment, Rochester, N. Y., has commenced the publication of *Ward's Natural Science Bulletin*. It will be issued irregularly this year for gratuitious circulation; next year it will be published regularly at a stated price.

ONE of the most important contributions to the August *Harper's Monthly* is Mr. Frederick G. Mather's paper, "Water-Routes from the Great Northwest." This paper is especially timely in connection with the opening of the New Welland Canal; and all questions of interest as to the future ascendancy of the Erie Canal or the St. Lawrence system, as well as the bearings of Mississippi transportation and railway competition, are very thoroughly discussed. The article is amply illustrated with maps and plans. Western merchants and shippers will find it to their interest to study it.

THE *North American Review*, for August, presents an admirable table of contents, but the most notable article is the discussion of Christian belief by Col. Robert Ingersoll and Judge Jeremiah Black, which will attract a wider attention than any article presented in any magazine in the country this month. The difference between the two is like that between an active, buzzing, and stinging poisonous insect, which, though brushed away over and over, returns to the charge more annoyingly than ever, and a strong man, who finally crushes it into an indistinguishable mass.

MT. CARROLL SEMINARY,

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In Carroll Co., Ill.—Incorporated in 1852, offers attractions peculiarly its own, in which *originality* it has no peer. In *thorough*, *practical*, *common sense* work it acknowledges no superior.

THE "OREAD," (*the students' journal*) *gives particulars and is sent* FREE.